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ARTHUR M. HYDE
Secretary

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FOREWORD

THROUGHOUT the civilized world agricultural research is largely a public function. It is so because few individuals or even corporations have the scientific interest, the public spirit, the money, or the personal incentive to do it well. As a private enterprise, it generally does not pay, principally because the benefits can not be monopolized but must be shared with the community. Publicly conducted, however, it pays large dividends. Not to carry on agricultural research would mean neglecting one of the greatest sources of private and national wealth. ¶This sounds like a truism, but it is apt to be forgotten in a period of depression such as that through which we are now passing. It may be supposed that the worth of agricultural research should be judged by the prevailing level of agricultural prosperity. That supposition leads to the conclusion that farm research should be slackened whenever profits fall. One might as well say that an army should drop its weapons at the first reverse. ¶The fact is that agricultural science is never more valuable than when the battle is going against agriculture. It is indispensable at the first line of defense—the cost-of-production line. Agricultural science shows farmers how to reduce their costs not only in production but in marketing. It is at once their protection against excessive loss and their best guaranty of renewed prosperity when the tide turns. Research that lowers production costs is not hostile to production control. True, more units may be produced when unit costs are lowered unless farmers take steps to prevent that development. But they can and should take such steps. Lower costs and production control are not antagonistic but complementary aims. ¶The United States Department of Agriculture is primarily a research institution, with correlated service functions. It presents in this Yearbook, in short popularly written articles, a partial account of its most recent results. For a full accounting ten such volumes would be required. It would be truer to say that a full report, certainly a full report each year, is impossible, because the Department's work is a continuous activity rather than a set of isolated projects pigeonholed in calendar years. What is discovered one year is not necessarily applied at once, though it has a practical application eventually. ¶The information contained in this volume, though constituting only a sample of the Department's latest discoveries and conclusions, bears witness to the practical value of what the Department does. It is a cross section of an immense structure of growing knowledge, cut so that the reader may infer the shape and character of the whole. The volume is the sixth in a series similarly organized. Each article is the work of a specialist. ¶Besides miscellaneous articles published under the heading "What's New In Agriculture," the Yearbook contains groups of articles on important themes. It includes also the Secretary's report to the President and a section giving the most significant agricultural statistics.

ARTHUR M. HYDE,
Secretary of Agriculture.

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THE YEAR IN AGRICULTURE

THE SECRETARY'S REPORT TO THE PRESIDENT

WASHINGTON, D. C., *November 14, 1931.*

To the PRESIDENT:

WORLD INFLUENCES UPON AMERICAN AGRICULTURE

American agriculture is not a separate, but an integral part of the world's economic system, and it is always deeply affected by financial, industrial, and social conditions at home and abroad. It is more affected by foreign conditions than is American industry, because it depends more heavily on the foreign market. When any country, from year to year, has an exportable surplus of a commodity or group of commodities, the prices realized for the export surplus determine the prices obtainable for the whole supply. In the last decade the United States has exported about 13.2 per cent of its agricultural production, and this trade has constituted approximately a third of our total exports. This third, it should be noted, represents only primary agricultural products in their raw or first processed form, such as wheat and wheat flour, and cotton. It takes no account of many agricultural products that are elaborately manufactured and exported as manufactured goods. Cotton manufactures, leather manufactures, numerous chemical products, and many other commodities are excluded. Forest products are excluded also.

Certain branches of agriculture, notably wheat growing and cotton growing, rest far more heavily on the foreign market than do our manufacturing industries. In short, our export trade in farm products brings a large part of the agricultural industry under foreign-market influence. The proportion of agricultural production which is exported is nearly twice as large as the proportion of industrial production exported. Agricultural prosperity in the United States, therefore, depends enormously on the purchasing power of the foreign market. When there is unemployment, a falling price level, and financial disorder in the countries that take our agricultural surpluses, American

agriculture feels the shock of a major depression. Its domestic as well as its foreign market is impaired because reduced foreign buying power means reduced industrial exports and therefore reduced domestic buying power.

These conditions are vital as long as we maintain our present level of agricultural production.

Our agriculture is burdened with surpluses. This has been repeatedly, and, in fact, almost continuously the case since the war. The burden is specially heavy now, not primarily because of great increases over normal production, but as a result of great changes in the demand for our products. The present season, as compared with other postwar years, is one of average total production. Had demand conditions remained as they were in 1929, the output in many lines presumably would have been absorbed without disastrous price recessions. Demand has declined to such an extent, however, that many branches of our agricultural industry lack a profitable outlet. Lines that were materially overexpanded before the crisis are in desperate straits now. When supply already exceeds requirements, a sharply falling demand makes it intolerably burdensome.

Why has agriculture's surplus problem become thus aggravated? And from what source or sources may relief be expected? Correct formulation of agriculture's basic problems is essential, for mistaken diagnoses lead to mistaken policies, public and private. Concretely the issue is whether agriculture faces a temporary or a permanent change in its general market situation. In either case, changes in its production will be necessary. But the kind and degree of these necessary changes should be determined by market trends. Explicitly our farmers will have to decide whether it will pay to produce as heavily for export as they have recently. This is the critical point because, as already noted, the foreign market exercises a decisive influence upon the profits of several major branches of American agriculture.

Relationship to European Market Changing

Our dependence on the foreign market arises, of course, from the fact that American agriculture was evolved largely as a source of supply for an expanding industry in other countries, particularly in Europe. In the last two decades this relationship has changed vitally. Changes no less important impend. American agriculture must adjust itself thereto, if it is to be prosperous. Many factors are involved. The most important, as already indicated, is the influence of the foreign market on prices both at home and abroad. Scarcely less important are long-time trends in foreign-market requirements, foreign purchasing power, and foreign competition. International relationships in industry and trade, as well as in agriculture, enter the situation. In former years mutually profitable exchanges between Europe and the United States were possible because this country needed Europe's industrial products and could take them in exchange for grain, meat, and fibers. But our own industry has grown beyond the needs of our domestic market. To-day we wish to export rather than to import industrial products. Furthermore, Europe now has other sources to which it can turn for agricultural goods. It is poor business to shirk facing such facts. Farmers should understand them because exceptional circumstances, most of them an outgrowth of the war, have stimulated our export trade in agricultural products far beyond the

level to which it would have tended had the war not thrown events out of their natural course.

Main trends in our changing relationship to the foreign market can be described briefly. In the nineteenth century the relationship of American agriculture to its foreign market was favorable. From 1870 to 1898 our agricultural exports, particularly in cereals, livestock products, cotton, and tobacco, mounted tremendously. These commodities went chiefly to the thriving industrial nations of Europe, whose growing populations became dependent on outside sources of supply. Excluding forest products, our agricultural exports rose from about $297,000,000 in 1870 to more than $840,000,000 in 1900. Expressed in an index of volume using the period 1910–1914 as 100, the export index number for 1870 was 25. For 1900 it was 122. The highest point was reached at 136 in 1898. Then a decline began that continued until the World War. We were approaching a balance between the domestic supply of, and the domestic demand for, agricultural products.

It is significant that the most prosperous period of American agriculture was not the era of rising exports, which in fact included years of ruinously low prices. Rather, the period (1898–1914) of declining exports was the prosperous time. Though we can not say that the decline in exports was the cause of the rise in prices, it obviously proved compatible with the advance. Agricultural prices rose more than the prices of other goods, and the rise was reflected in a rapid and steady increase in agricultural wealth. The average valuation of farm real estate in the United States doubled from 1900 to 1910, and the gain continued at an increasing rate until the war.

Why Farm Exports Dropped Before the War

Our agricultural exports declined before the war for two principal reasons. In the first place, they declined because the United States market increased. Growing consumption at home more than compensated for the decline. Our population increased from 73,000,000 in 1898 to 98,000,000 in 1914, and became more concentrated in cities. The standard of living advanced. Our national wealth, according to the census, increased from $88,500,000,000 in 1900 to $186,300,000,000 in 1912. In the same period wealth per capita of the population rose from $1,165 to $1,950. This was a period of rising prices, hence the gain in real wealth was somewhat less than the indicated gain in money values. It was substantial, nevertheless and brought about a more rapid increase in our consumption than in our production of the principal agricultural commodities, though this production increased rapidly. Accordingly agriculture had favorable supply and demand relationships despite its loss of ground in the foreign market.

In the second place, our customers abroad turned increasingly to other sources of supply; to Canada, Argentina, and Russia for grain; to Argentina for meat; to Australia and New Zealand for sheep and dairy products. Foreign countries, with cheaper land and most of them with cheaper labor, were competing with us in the importing markets. Countries in the pioneer stage of agricultural development had advantages comparable to those enjoyed by the United States in its earlier history. In consequence, our farm-commodity exports, including cotton, dropped about 36 per cent from 1898 to the period 1910–1913.

Trend Reversed in War Period

This whole situation, which seemed to promise stable prosperity for agriculture, was profoundly altered by the war. Our agriculture was expanded to meet war-time needs, and the trend toward a lessening dependence upon the European market was speedily reversed. When the war eliminated Russia from international trade in agricultural products and reduced the production of most European countries it gave an immense impulse to production elsewhere. In the United States, Canada, Argentina, and Australia the cereal acreage in 1921 was nearly 20 per cent greater than before the war. Canada's wheat acreage more than doubled. Pork production in the United States, beef production in Argentina, and dairy production in Argentina and New Zealand were tremendously stimulated. By 1918 our own farm-commodity exports, including cotton, reached a point 45 per cent above the pre-war level. More American beef, pork, and cereals were exported to Europe than were sent there at the height of our agricultural export trade in the nineties. From the standpoint of our permanent agricultural interests, this was a hazardous development, which left us with enormous surplus-production capacity.

Surplus production persisted long after the need that called it into existence had passed. Though our agricultural exports decreased in volume after the war from 145 per cent of the pre-war level, the high point reached in 1918–19, to 104 per cent of the pre-war level in 1923–24, they advanced to 136 per cent of that level in 1926–27. In the crop year 1929–30 the volume of our agricultural exports was 97 per cent of the prewar level. Many products, however, were still exported in volumes much exceeding the pre-war averages. Our net exports of grain and grain products in 1929–30 had declined greatly but were still 130 per cent of the pre-war level. Exports of cattle and meat products remained above the pre-war level.

Effective European Demand Overshot

Even had Europe regained its pre-war purchasing power it would not have been a profitable market for all the surplus farm production we had to offer. For one reason, other countries were offering large surpluses there, too. In 1921 exports of pork from all the principal surplus producing countries were 80 per cent greater than before the war. Total exports of beef from the surplus countries were 63 per cent greater than before the war, of butter 104 per cent greater, and of cheese 30 per cent greater. At the same time, Europe was restoring its domestic agriculture. Recovery came first in Denmark and the Netherlands, which were disturbed by but not directly involved in the war. Next, the former warring nations of Europe increased their output. By 1927 the cultivated area of Europe, outside Russia, was back to 97 per cent of the pre-war average. Europe's production of milk, butter, cheese, and pork was above the pre-war level. By 1930 Russia had resumed the exportation of cereals and other agricultural products. In such circumstances even a prosperous Europe would probably have desired less of our farm production than it took before the war. In the hard conditions of the postwar period, it desired much less. True, it took large quantities; but it did so at bargain prices, which returned little or no profit to our producers.

The war, in short, left American agriculture excessively dependent on the European market. Europe's capacity to take American agricultural goods depends essentially on three factors: Its purchasing power, the volume of its own farm production, and the quantity of farm production available to it from other sources. When we compare Europe's present condition with its pre-war prosperity, and consider also the increased competition our farmers meet there, it is obvious that our agricultural exports are still too large. In the contraction of our farm exports from 1900 to 1914, American farmers, as already noted, suffered no harm. They suffered acutely from the decline after the war. This contrast is easily explained. In the prewar period our farm production, though it steadily increased, did not increase more than the total market, domestic and foreign. In the postwar period, on the other hand, the production increased much more rapidly than the market, and corresponding increases took place in other agricultural countries. As a result of technical progress, farm output per man engaged in farming in the United States jumped about 15 per cent between 1919 and 1924, and it has increased since. Meantime acreage has increased. Yet not only the foreign market, but the domestic market has weakened, partly because the population is increasing less rapidly than formerly. In the present downward trend of our agricultural export trade, the home market has relatively more slack to take up than it had before the war, and less capacity to do it. Hence the favorable supply and demand relationships that existed then can not be restored without sweeping adjustments in production.

Export Decline Retarded by Credits

This country's agricultural exports to Europe after the war would have fallen more had not the trade been supported by a liberal credit policy. It depended extensively on American capital loans. Nearly half the $10,500,000,000 loaned by the United States Government to foreign governments was loaned after the war. Loans by private investors after the war came to nearly the same sum. All told, American capital loans to foreign countries, mostly European countries, between 1914 and 1930 aggregated approximately $23,500,000,000. These advances financed an export movement of industrial as well as of agricultural goods, but in the trade with Europe the agricultural goods predominated. Even with its purchasing power thus augmented, Europe was obliged to curtail agricultural imports. It raised tariffs and adopted milling restrictions to limit dependence on grain imports. It substituted vegetable for animal fats and oils. When in 1929 the stream of American credit to Europe dwindled, Europe was forced to cut its agricultural imports still more. Europe's credit difficulties have reacted vitally upon our agricultural export trade, which can not continue as if nothing had changed.

Monetary Factors in the Depression

Still another aspect of the international credit situation reacts adversely on our agricultural export trade. Before the war the United States was a debtor country, and foreigners owned much of the capital invested in our factories and farms. Our chief creditor was the United Kingdom; other countries, however, had substantial investments in the United States. It was necessary for us to pay

interest on the borrowed capital and to liquidate some of the principal. This was accomplished chiefly by the exportation of goods. Our debtor status, in its later stages, produced a heavy balance of United States exports over imports. This did not embarrass the creditor countries because in effect they had paid in advance for much of what we had to send abroad. It is different now. In the war period we paid off our debts and became a creditor country. As a consequence our balance of exports over imports, though it continued, became utterly changed in character. Instead of being a net addition to the current income of the principal importing countries, it was a charge against their future income. It put them in a fiscal position similar to the one from which the United States had emerged. It obliged them to work toward exporting more than they imported. Since they found it difficult to increase their exports, they had to cut down their imports. This necessity will continue as far ahead as we can see. It can not, for obvious reasons, be met as easily as the United States met a similar necessity when this country occupied a debtor rôle. For one thing, the United States does not need what Europe produces as urgently as Europe formerly needed what this country produced. In other words, the Old and the New World are now less favorably placed to exchange goods and services. Each hemisphere is well developed industrially, and deficits are substantial only in Europe's agricultural wants. True, these deficits must be met. But whether they will be met in ways advantageous to the farmers of the United States is a question. Since we do not require Europe's industrial surpluses, Europe may be forced, in large measure, to do without our agricultural surpluses.

Another factor in our agricultural problem lies in Europe's monetary disorders. When Great Britain and other countries resumed gold payments in 1925 and 1926 they released forces that redistributed the world's gold supply. Surpluses accumulated in creditor countries while debtor countries ran short. When gold-standard countries have insufficient gold, they contract their currencies and credit. This causes prices to fall. American agriculture would have been hurt even had it avoided expansion in production. But this should not blind us to the additional handicaps that result from unrestricted production. It is difficult to measure the relative influence of the monetary and the nonmonetary factors in the present crisis. Both, however, are important. Agriculture's attention is properly centered upon the latter because they are measurably within its control. Unless production is adjusted, low agricultural prices will continue after Europe's money troubles are remedied.

The part played by general deflation in the agricultural depression has caused some persons to declare that underconsumption rather than overproduction is the main trouble. This is a distinction merely of words. The surplus is the important thing. Whether created by overproduction or enhanced by underconsumption, the supply controls.

Two Fundamental Requirements

The situation has two fundamental requirements. First, the credit and purchasing power of Europe must be restored. This is essential not only for European welfare but for our own, because we shall need the foreign market indefinitely for some of our products. Second, American agriculture must adjust itself to a declining export trade.

As things stand, this need will persist, no matter how favorably matters develop in Europe, because our production is overexpanded in relation to Europe's wants. Should Europe's economic recovery be slow, the necessity for diminishing our farm exports will be the more pressing.

This is not a policy of defeatism, a passive acceptance of declining business. It is a policy of constructive adjustment to a radically changing market situation. What counts in agriculture is not primarily the volume, but the profitableness of farm production. It is better to contract the agricultural industry profitably than to overproduce unprofitably. Here is the challenge of the present situation. In a market that does not keep pace with the increase in production capacity farmers must adjust their production. If they do this by withdrawing the less productive acres and livestock, they reduce their surpluses and often also their costs of production. Thus they reap a double advantage. They get higher prices and also benefit from wider margins between prices and costs. This favorable margin can be increased by individual efficiency. I discussed the necessity of crop adjustments in my report last year (pp. 24–30) and need not repeat here what I then said. It is a gross error to suppose that efficiency in agriculture leads inevitably to overproduction. It tends on the contrary to promote a good adjustment between supply and demand, because it discourages wasteful competition. It is time to revise the crude notion that only a continually expanding agriculture can be a profitable agriculture. Expansion is justified only when the market is expanding too. When the market is declining or is not expanding at its former rate agricultural profits wait upon adjustment to the change. Effecting this adjustment does not mean abandoning the market to our competitors. It means producing for a real as distinguished from an illusory market, and supports the advantages this country possesses in natural resources, capital, and managerial ability.

This recommendation to reduce the volume of our agricultural exports does not challenge the ability of our farmers to meet foreign competition. They can produce, with or without tariffs, as cheaply as farmers anywhere. But to do so they would have to accept lower living standards.

Surplus Difficulties Largely Export Difficulties

Overproduction is not necessarily and invariably production for export as distinguished from production for the domestic market. It is possible to have an oversupply of goods that are essentially on a domestic basis, such as dairy products and wool, as well as of goods produced largely for export. Taking our agriculture as a whole, however, it is surely true that surplus difficulties are now largely export difficulties. The farm commodities that we sell heavily in foreign markets are those that are depressed most seriously. Wheat and cotton are conspicuous examples.

In urging an agricultural policy directed toward lessening our dependence upon foreign markets we do not ignore the relationships in which different leading products stand toward the export demand. With some products, such as cotton, we have natural advantages that give us competitive strength in international trade. With other products, such as wheat, our position is less advantageous. No uniform prescription can be given as to the place that different commodities should occupy in the export trade. But if a declining agricultural export

trade was compatible with American agricultural prosperity before the war, when foreign competition was relatively weak, and when foreign purchasing power was rising, it is much more in order now.

Rapid Shift to Domestic Basis Impracticable

The surplus-production capacity that American agriculture now has can not be quickly eliminated, and a sudden shift from an export to a domestic basis is not practicable. Some branches of our agriculture, moreover, can compete successfully in foreign markets, even against the pressure of world-wide overproduction. Exclusive of that grown in China, this country, for example, produces about 60 per cent of the world's cotton crop; the economy of specialization in cotton as a cash crop supplemented by home-grown food and field crops, gives many of our growers an advantage even in bad years. The tobacco situation is similar. Excluding Russia and China, the United States produces about 40 per cent of the world's tobacco crop and holds a dominant position in the international trade. It does not follow, however, that unrestricted production of these crops for the export market is warranted. Cotton and tobacco prices, as well as the prices of cereals and meat products, reflect foreign-market influences significantly. There is no profit in persistent overproduction for a declining foreign demand. Our producers may be able to stand the loss as well as any of their foreign competitors, but it is poor business to do so unnecessarily. They should grow the quantity of each crop that can be absorbed, with profit to themselves, either in the domestic market or the foreign market, or in both. When wheat sold at $1 or more a bushel in western markets, thousands of producers could grow it profitably for export who can not do so at present prices. Their production in recent years has evidently been adjusted to the prices previously received. It could have been more desirably adjusted to price prospects.

With human wants still unsatisfied, overproduction seems an anomaly. Farmers, however, cannot produce for a market that can not buy. They must realize a profit. Agriculture throughout the world has persisted since the war in increasing its production beyond the purchasing power of the available market. This is competition run amuck. It brings no benefit in the long run even to the purchaser, because the distress inflicted upon agriculture hurts other industries, limits their markets and their profits, and forces them to lay off workers. Trade depression such as the world has gone through in the last two years emphasizes, though it does not create, the disparity between agriculture's production capacity and its market. It stresses the folly of production without reasonable prospect of a profitable sale. Agriculture can not shut down as manufacturing industries sometimes do when demand falls off; but this does not mean that agricultural production should continue to disregard market developments. Reducing farm production may often be difficult and sometimes costly, but its difficulty and its cost will certainly be less than that of continuing production on a scale in excess of demand.

Home Market's Importance Not Minimized

This is not an attempt to minimize the importance of the domestic market. We merely emphasize the influence of foreign conditions upon some of our principal crops. If a surplus must be sold abroad,

the price falls in the domestic market to a point at which foreigners will buy. This explains why foreign takings have a greater influence on prices than their proportion to the total supply would indicate. No device can be a remedy which tends to increase exportable surpluses. Actually to reduce these surpluses is the only logical course. They can not be forced into unwilling markets.

There is a reverse side to the picture. American agriculture is not wholly on an export basis. Many of its products find a sufficient market within our borders. But this fact, though it may mitigate, does not destroy the influence of the export surpluses. Commodities that can not be profitably exported may sometimes be substituted at home for products not ordinarily exported, as when wheat replaces corn as feed for livestock. In this way the market for commodities usually on a domestic basis is weakened. Furthermore, slow export trade may prompt farmers to shift their crops so that overproduction may result in crops ordinarily produced exclusively for home consumption. Thus export surpluses tend to weaken the whole structure of agricultural prices. In such conditions an expanding home market lacks the beneficial influence it would otherwise have. No one can tell what the ultimate position of American agriculture in world trade will be. Developments not now foreseen may change matters radically. New foreign markets may be developed, and old ones may be recaptured through technical progress. Present conditions, however, certainly indicate that smaller production for export would mean a more profitable American agriculture.

The Influence of the Tariff

As we produce less for export, the tariff on agricultural products will become more effective. Agriculture will benefit in two principal ways. It will share in the results of a better adjustment of world production to world demand, and will have a stronger, more sheltered domestic market. Tariff protection is of course indispensable to this latter result. Prices can not be higher at home than abroad unless tariffs stand between the domestic and the foreign market. Tariff protection for agriculture is part of our national policy. There is no reason to fear that it will be discontinued. It is already effective for many crops formerly governed entirely by the world market, and covers a progressively larger proportion of our agricultural output. The advantage is not confined to crops definitely and permanently on a domestic basis. It extends to crops still produced substantially for export, because it lessens the incentive to produce these crops in excessive quantities. Farmers have an increasing number of sheltered crops to which they may turn.

The tariff act of 1930 accorded well with agriculture's needs, both present and future. It increased the rates of duty on agricultural products about 30 per cent. This change, besides strengthening the home market for many products already on a domestic basis, enabled farmers to put additional products in a similar position. The new rates helped agriculture materially. Practically all our agricultural imports, both dutiable and free, declined under the influence of the depression. But the dutiable imports declined much more than the free imports. In the 12 months following the passage of the act our imports of dutiable agricultural products fell off by 33 per cent, whereas our imports of duty-free agricultural products declined only 7 per

cent. This difference was clearly, in large part, a result of the new tariff. The world's difficulties would not otherwise have caused so unequal a decline. Had the new tariff law not been in effect, world competition would have been felt by our farmers disastrously in the domestic as well as in the foreign market.

No fiscal policy can guarantee agricultural profits in a time of depression. A tariff is justified if it diminishes losses. By this test the tariff act of 1930 is already a demonstrated benefit. Its benefits should be substantial when economic conditions once more become normal. The tendency, then, as has already been indicated, will be toward increased dependence on the home market. As export surpluses diminish, American standards will become effective on a steadily lengthening list of farm commodities. Agriculture and manufacturing industry in the United States are exchanging rôles in relation to the world market. The former is becoming less and the latter more dependent on export trade. Only the tariff can make this change beneficial to agriculture. On a long view its potential advantages far outweigh its present advantages, substantial though these are.

HOME MARKET AND FARM INCOMES

When surpluses can not be sold abroad they pile up at home. Economic depression abroad can throw many branches of our agricultural industry into distress; when such depression is associated with like conditions in the United States, all agriculture is affected.

In the last year the domestic demand for farm products has declined to an extent rarely before equaled in so short a time. This is mainly traceable to changes in the level of industrial activity, which changes are the most important single cause of fluctuations in the home market for the agricultural goods. In the 1929–30 season industrial production in the United States fell about 20 per cent below the level reached in the preceding year. A further decline of nearly 20 per cent took place in the 1930–31 season.

Money incomes of factory workers declined more than the volume of industrial production. This reduction, besides involving an enormous cut in the purchasing power of wage earners, reflected a decline in the buying power of other urban groups, since it betokened reduced industrial profits. Wholesale and retail trade and the professions were damaged proportionately, with bad effects upon the farmers' markets. Some groups with more or less fixed money incomes found their purchasing power increased through falling prices, but the trade slump caused a heavy net drop in the purchasing power of the Nation as a whole.

Agricultural Prices Decline Most

Trade depression invariably causes agricultural prices to fall sooner and lower than the prices of other goods. This tendency, which was painfully in evidence in the depression of 1921, received a new demonstration in 1930 and 1931. In a general price decline such as that which has affected practically all commodities in the last two years, agriculture would be injured even had its prices not fallen more than those of other economic enterprises. Falling prices always mean falling profits, since costs of production never decline proportionately at once and usually not for a long time. The injury to agriculture is greatly increased by the excessive degree to which farm commodities

have been affected. Special interest attaches to this aspect of the problem because it suggests part of the remedy. When agricultural prices fall more than other prices, the fact shows, among other things, that agriculture is having more difficulty than other industries in readjusting its production.

Causes of the Disparity

Such disparities tend to disappear as business revives. Farm prices which fall faster in depressions rise faster in recoveries. The disparities arise in periods of depression from the fact that farm production is not easily or quickly adjusted to market changes, whereas the output of many nonagricultural commodities is adjusted promptly. In agriculture, production continues to overshoot demand; in industry, on the other hand, the maladjustment between supply and demand shows itself in unemployment rather than in a persistent accumulation of commodities. Hence, agriculture is penalized unavoidably. Its readjustment difficulties are intensified by the fact that other economic enterprises solve such difficulties by methods that weaken the farmer's market. Another factor in widening the spread between agricultural and nonagricultural prices is the difference in competitive conditions in agricultural and in industry. The prices of practically all agricultural products reflect changes in demand conditions quickly. On the other hand, the prices of many nonagricultural products are more or less customary, and depend largely on elements other than those springing from the immediate business situation. Then, too, agriculture is handicapped by relatively great difficulty in reducing its overhead costs. All these circumstances are finally expressed in a lagging agricultural adjustment to the diminishing market. Crop shifts take place, but agricultural production as a whole tends to be maintained. Our total acreage this year is about the same as it was last year; on this acreage we are producing surpluses that demoralize the markets and return no profits to farmers.

Price changes, absolute and relative, are not the only factor in determining farm incomes. It is necessary to consider also the volume and the cost of production. Fairly comprehensive statistics are available as to the volume, but not as to the cost of production, which varies greatly on different farms and in different regions.

Gross Returns From Farming

Some measure of the decline that farm earnings have suffered in the last two years is afforded, however, by data available as to the gross return from agricultural production. Gross income from the agricultural production of the United States for 1929 was about $11,911,000,000, and in 1930 about $9,347,000,000. It is not yet possible to state the gross income from the farm production of the current season. On the basis of figures heretofore available it may be less than $7,000,000,000. The recent upturn in prices will of course affect the estimate.

At this writing (November, 1931) some of the principal crops are not yet completely made, and the marketing season has several months to run. Certain broad conclusions are indicated. Thus, in the first eight months in the calendar year livestock and livestock products were marketed in about the same volume as in the corresponding period of 1930, but the prices were very much lower. On October 15,

1931, the prices received by farmers for this group of commodities averaged 36 per cent below those of the corresponding date in the previous year. The prices of dairy and poultry products were 21 per cent lower.

In 1930, the last year for which complete data are available, gross income from grains was only $760,000,000, as compared with $1,281,000,000 in the previous year. Gross income from cotton dropped to $748,000,000, as compared with $1,389,000,000 in 1929. Income from meat animals was about $2,455,000,000, as against $2,817,000,000 in 1929. All livestock and livestock products brought a gross income of $5,296,000,000, or about 15 per cent less than in the previous year. The corresponding reduction in the income from field crops was about 48 per cent. Net income from agricultural production in 1930 declined proportionately more than the money incomes of factory employees and considerably more than the incomes of certain other groups.

Net returns to producers, which are what is left after deducting the expenses of production, unquestionably declined proportionately more than the gross returns. In field crops, prices declined proportionately much more than the production increased. Grain production is only moderately greater than it was last year, yet grain prices on October 15, 1931, averaged about 50 per cent below those of October 15, 1930. Cotton production is about 22 per cent greater than in 1930, yet cotton prices on October 15 were 45 per cent lower than on the corresponding date of the previous year. The production of fruits and vegetables increased somewhat; the prices of these commodities averaged about 45 per cent lower. At the prevailing price levels, the year's increased volume of production not only failed to prevent the gross farm income from declining below that of the previous year, but did not prevent it from falling below that of the depression year 1921.

Effect on Net Incomes

Some small compensation for price declines has come to the farmers during the last few years in the shape of reduced production costs. In 1930, and to a still greater extent this year, necessary expenditures for labor, fertilizer, farm equipment, machine supplies and repairs, and feed and seed declined. Farm wages and prices of the goods used in farm production were about 15 per cent lower this fall than last fall. As already indicated, however, the expenses of farm production tend to decline less rapidly than the prices of farm products. Against a 15 per cent drop in certain leading farm expenditures, it is necessary to set a possible 25 per cent drop in gross farm income in 1931. Furthermore, not all the reductions that take place in farm expenses go on the credit side of the agricultural ledger. Feed and seed, for example, are bought by some farmers and sold by others. Thus gain to one group is offset by loss to another. Savings on labor, machinery, oil, gas, tires, etc., are, of course, actual net savings to agriculture. They do not suffice, however, to offset the tendency of other farm expenses to remain fixed in time of depression. Taxes do not fall with farm-commodity prices nor do interest charges and principal on mortgage debt. When the purchasing power of farm commodities falls as much as it has since 1929, the proportion of the farm output that must be surrendered in payment of taxes and principal and interest on loans increases. Perhaps the heaviest burden that depression puts on agriculture is the difficulty it creates in meeting fixed charges.

Reductions in the expenses of production have not nearly sufficed to counterbalance the drop in gross incomes. Hence the net income of the farmers from the production of 1930 declined proportionately more than the gross income. It fell short of providing a wage allowance for the farm operator's labor at going farm-labor rates, and left no net income whatever available for the farmer's capital or management.

Adjustment to Main Trends Imperative

Agriculture, if it is to be continuously profitable, must be adjusted to long-time trends. This fundamental requirement is far more important than the need to vary farm output with temporary market changes. It is desirable, of course, to match temporary market shifts with corresponding adjustments in output. It is imperative to make adjustments to long-time changes. When main trends turn against agriculture, the penalty for failing to adjust output is disaster. It does not follow, simply because a certain volume has been absorbed not unprofitably for a number of years, that a sound balance has been struck. Possibly the production has been continued for a market essentially precarious. This is potential overproduction which may turn suddenly into actual overproduction. Even when business becomes active again, a brake will have to be kept on some branches of American agriculture.

CROP ADJUSTMENTS MADE BY FARMERS

Extensive crop shifts have been made by the farmers of the United States in recent years. Unfortunately these shifts have not gone far as yet toward adjusting production to consumer demand. Contraction in some regions has been offset by expansion in others, particularly in wheat and cotton. On the whole, expansion has exceeded contraction. This is so plainly against the interests of the farmers that careful study of the question is necessary to indicate how crop adjustments may be better engineered. The best way to see what is required is to note the results of what has already been attempted.

Net farm incomes have been so low since the war that the farmers might have been expected to reduce their acreage. Instead they increased it. In 1930 the United States had 366,500,000 acres in crops, the highest total on record. This was an increase of 55,000,000 acres since 1909. Lessening demand for farm products, at home and abroad, and repeated warnings against overexpansion did not prevent the 1930 crop area from increasing 2,000,000 acres over that of 1929. The increase over the 1909 figure is specially remarkable since the last 12 years saw a decline of about 8,500,000 head of horses and mules on farms and a consequent release of approximately 20,000,000 acres (not including pasture) formerly required to produce feed for work stock. Land thus released, which previously produced raw material for animal power, now produces foodstuffs for the market. Wheat acreage, which rose from 44,262,000 acres in 1909 to nearly 75,694,000 in 1919, dropped after the war to 52,535,000 acres in 1924, but rose again to 61,464,000 acres in 1929. The acreage for harvest this year, despite the low prices that prevailed for wheat during 1930, was reduced only about 6 per cent below the 1929 level.

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Regional Changes Conflict

Regional aspects of the wheat-acreage problem show the difficulty of getting concerted action when reduction is desirable. In the region east of the Mississippi wheat acreage dropped from about 18,000,000 acres at the close of the war to about 11,000,000 acres in 1930, or to a point below the pre-war level. West of the Mississippi, however, tremendous expansion occurred, particularly in the southwest winter-wheat States. Kansas's wheat acreage this year is estimated at 12,572,000 acres, as against 4,810,000 in 1911. Montana last year harvested 4,000,000 acres of wheat, as compared with less than 1,000,000 acres in 1914. The aggregate wheat acreage of Colorado, Nebraska, Texas, and Oklahoma in 1930 was 11,400,000 acres, as compared with about 7,800,000 acres in 1914. Reductions in the East, where farmers can turn to other crops, were more than offset by increases in the West where crop shifts are difficult.

Equally striking is the way in which cotton acreage reductions in one region were offset by expansion in another. In the old Cotton Belt, where the boll weevil did heavy damage in 1921, 1922, and 1923, cotton as the principal cash crop was wiped out in some sections, and some cotton land went entirely out of production. In the weevil-infested area generally cotton was widely replaced by feed crops and pasture. In the cotton States east of the Mississippi the acreage in truck crops increased, from 1919 to 1930, about 154 per cent. West of the Mississippi, particularly in Texas and Oklahoma, the cotton area increased greatly. Texas and Oklahoma together had 23,000,000 acres in cotton in 1926, as compared with 12,900,000 acres in 1919. This year the cotton acreage in these two States is about 3,500,000 acres below the 1926 figure. Our total harvested cotton area in 1930 was 45,218,000 acres, as against 33,566,000 acres in 1919.

Corn Acreage Remarkably Uniform

Our corn acreage has been remarkably uniform at about 100,000,000 acres for several years. Though the acreage in corn this year is the largest since the record acreage of 1917, it is only 8.6 per cent above the lowest acreage in the last quarter of a century. Corn acreage is relatively stable because the crop returns a comparatively large gross income per acre under a wide range of climatic conditions. Nevertheless, regional adjustments take place. Corn has moved west and north in the last decade. A reduction of about 5,200,000 acres east of the Mississippi has been offset by an increase of about 7,800,000 acres in Minnesota, North Dakota, Iowa, South Dakota, and Nebraska.

Flax acreage increased from 1,113,000 acres in 1922 to 3,692,000 acres in 1930, to some extent at the expense of wheat and grass. The production of truck crops and vegetables (not including potatoes) has increased at an average rate of about 10 per cent a year since 1921, though in the last few years the outlook for these crops has not been satisfactory. Vegetable and truck-crop production, however, can be increased greatly without drawing much land from other crops.

When major crops are overproduced, the difficulty may be mitigated but can not be overcome for the country as a whole by changing to minor crops. Six major crops have a combined acreage which usually makes up more than 85 per cent of the total crop acreage. These crops are corn, hay, wheat, cotton, oats, and barley. Only about 46,000,000

acres, or less than half the area we devote to corn alone, is used for producing 70 or more minor crops. It is obviously impossible to change largely from the production of these major crops to the production of the minor crops without disturbing the market for the latter. Sizeable acreage adjustments among the major crops necessitate either changing from one major crop to another, abandoning crop land, or increasing the area in pasture. Shifting acreage in the major crops is practicable only when some of them are in short supply. Abandonment of acreage, though large in recent years, may be offset by expansion elsewhere. Returns from most pasture are relatively so low that a change from crops to pasture is a last resort where land is good. All the courses open are difficult, a fact which largely explains the tendency of farm production to stay above market requirements when demand falls. It is a tendency that must be combated if farm profits are not to vanish altogether in a period of rapidly falling prices. Temporary abandonment of farm land in extreme situations is preferable to farming it at a loss. The individual farmer faces many practical difficulties in adjusting production, as will be pointed out presently. The main problem is one of reconciling individual interest to group interest through concerted action of producers.

Adjustments in Livestock Production

Changes in the production of livestock can not be made as quickly as changes in the production of field crops, though the output of some livestock products can be changed quickly. Shifts in hog production mainly go in cycles, but depend on shifts in field crops, and also on changes in the use made of crops. Dairy expansion in the Eastern States in recent years has gone along with a decline in hog numbers in that area. On the other hand, hog production has increased where corn has replaced wheat and other crops. Hog producers have partly met the challenge of declining prices by increased efficiency both in swine sanitation and in the utilization of feed. In the beef-cattle industry, which has a long production cycle, adjustment to declining prices is extremely difficult. Since 1928 the number of cattle on farms has increased from 55,500,000 to 59,000,000, despite warnings that increased production would mean lower prices. The greatest increase has taken place in the North-Central States, where pasturage, roughage, and grain are most abundant. Production is at last being curtailed in the sheep industry, whose output expanded 43 per cent between 1922 and 1931. The expansion was general in all sheep-producing sections and continued despite numerous warnings that overproduction impended.

Outlook Service

Such facts show that attempts of farmers to shift their production to better paying lines are often confused and conflicting. Better facilities for concerted action are needed. Some progress has been made in developing such facilities. There is growing solidarity among farmers in the cooperative movement and in various other forms of organized effort. There is also rapid growth in the use of economic information as a basis for cooperative adjustments. The Department of Agriculture collects and interprets the data needed. This service deals not only with the supply of and the demand for various products, but also with farm-management problems. Too often farmers adjust their production on the basis of currently received prices or prices received in the

preceding year, apparently in the mistaken belief that similar prices will necessarily continue. This practice is a basic cause of cyclical fluctuations in production. Alternate expansion and contraction result in wasteful crop and livestock shifting.

Farmers must take into account a complexity of forces in planning their production program. They can not supply themselves with the necessary information and its interpretation. This fact, and the public importance of adjusting production to demand, make the task of supplying outlook information a public function. The department began systematically to meet this need eight years ago, when it established an outlook service. The service has become a cooperative undertaking between the department and State agencies.

It is planned in national, regional, and State conferences. The resulting information is made available to producers in all parts of the country, through published reports, press material, radio addresses, and direct contacts with farmers. In 1930 six national and regional conferences were held, with nearly 400 State specialists in attendance. Forty-five States issued special outlook reports supplementing the department's data and interpretations with information specially pertinent to particular States and local areas. Nearly 1,300 meetings were held for training local leaders in this work, as compared with 540 such meetings in 1929. Also 9,135 farmers' meetings, with an aggregate attendance of 601,000, were held to disseminate economic information, as compared with 4,240 such meetings with an attendance ance of 204,000 in 1929.

Economic information is meeting a rapidly growing demand in vocational education. In the last fiscal year approximately 95,000 farmers were enrolled in evening classes, as compared with 65,000 in the preceding year. Those in charge of this work in the Federal Bureau for Vocational Education cooperate with specialists in the Department of Agriculture. Economic material has an important place in the instruction.

Regional differences in soil, topography, and climate, and in other factors of fundamental importance in shaping types of farming and trends of production, are recognized by the department and the State agencies in their research and extension work. In farm-management investigations a beginnning has been made in determining differences in types of farming and in organizing research into regional programs.

Compulsory Adjustments Inadvisable

I have repeatedly emphasized the need for curtailing acreage and livestock breeding, and have urged that this be done by voluntary concerted action. This course seems preferable to the compulsory production control lately advocated in the cotton States. The doctrine that production can be better controlled by law than by the judgment and decisions of producers is probably repugnant to our Constitution and certainly repugnant to the character of our economic system. Production adjustments are more necessary now than they were a year ago. Appeals made then for voluntary concerted action met with an inadequate response. It has been inferred that voluntary action must fail unless supported by legal action. This does not necessarily follow. Acreage cuts and reductions in livestock breeding were relatively small last year, probably because farmers were not then convinced of their urgent necessity. The situation has changed so

much since that it seems impossible to doubt that they are convinced now. If they are, voluntary action should do what is required. If they are not, legislative action will meet with resistance.

All plans for general cuts in production meet the difficulty that farm production costs vary on different farms and in different localities. Hence prices that mean loss in one place may permit profits elsewhere. Individual farmers can sometimes do business profitably at prices that ruin their neighbors. When prices fall, it is advisable for most farmers to reduce their output. But it never happens that they should all reduce their production to the same degree. Reductions should be adjusted to the necessities of individual farms, so that the higher-cost acres and animals will be withdrawn first. Blanket reductions, applying equally to all farms and all farmers, are not desirable because such reductions press equally on the efficient and on the inefficient farmers, and equally on good and poor land. This goes against the first law of efficiency.

Under the plan of voluntary adjustment, many individuals must agree on a common course before anything can be accomplished. Moreover, the equal participation of all areas and all individuals can not be assured, nor can an equal distribution of the resulting benefits. These are undeniable difficulties. Yet I think they are less serious than the difficulties that would arise from a compulsory control of production. Such a system would fail completely to allow for the different necessities of different farms and different regions. It would certainly be opposed. It would also be inflexible. Lawmaking could not keep pace with market developments at home and abroad. Eventually the control laws would be ignored. In so far as they were observed they would tend, far more than any plan of voluntary adjustments, to throw our crop system out of balance, because quick crop shifts would be largely ruled out. Arbitrary reductions in the acreage of one or two crops would divert excessive effort to other crops. Surplus difficulties would spring up in new places, under conditions tending to perpetuate them. With their initiative fettered, farmers would find remedial action difficult. Moreover, the proposals so far made for the legislative control of acreage are State or regional proposals, whereas our problems of agricultural production are essentially national. Regional action can do nothing not likely to be offset by opposite action in other areas.

Individual Readjustments

Many difficulties confront farmers who wish to promote regional crop readjustments. When an individual farmer has no assurance that the other farmers will join in reducing the acreage of a crop, he must try to establish the combination of crops and livestock that promises the most return on his own farm. When prices are very low, readjustments by shifting from one combination of cash enterprises to another do not produce significant increases in the farm income. Such readjustments, however, are not without importance, though they do not fully meet the emergency. Readjustments on individual farms may bring results (1) by increasing the noncash income of the farm family in food and feed crops and meat and other livestock products for use on the farm, and (2) by curtailing cash outlays. Extension workers emphasize the "live-at-home" type of farming. This is much to the point now. Through these two methods—pro-

duction of more commodities for direct use on the farm and modification of farm practice to save cash outlay—reduction takes place in the commercial output of farm products through the actions of the individual farmers. These adjustments are, at best, a painful process, which emphasizes the urgent necessity of avoiding or at least minimizing the price slumps in agriculture by voluntary adjustment through concerted action.

Efficient Methods Reducing Costs

Mechanization continues to reduce costs of production in agriculture. With modern equipment one man can now handle 160 or more acres in the Corn Belt, as compared with an average of about 80 acres only a few years ago. Two-row and four-row cultivators handle nearly two and four times as much corn as the old one-row cultivator handled. Two-row mechanical corn pickers, with two men to run them, do as much work as six hand pickers. Duck-foot cultivators and row weeders almost eliminate the necessity for plowing in the summer fallow wheat areas of the West, and increase materially the summer fallow handled by one man. In the Great Plains a 16-foot combine harvests and threshes 35 to 40 acres of wheat a day. One such harvester can handle 500 acres of grain in 15 days. In 1928 the cost of harvesting an acre in Kansas by the combine was about $2.20, as compared with $3.50 for harvesting with a header and thresher, and $4.40 for harvesting with the binder and thresher. Nearly 66,000 combines were sold in the United States in the period 1927–1930. In Kansas the number of combines increased from 2,796 in 1923 to 16,631 in 1929. Combines are now used in every State in which small grains are of any importance. In the Mississippi Delta, with modern power machinery, only 30 to 35 hours of man labor are required to grow an acre of cotton ready to pick, as compared with 80 hours under the old 1 or 2 mule system. In haying, one man, with a tractor-drawn mower and a side-delivery rake, covers 25 acres a day, or fifty times the area one man could cut and rake a century ago. If the windrow needs turning, it can be done with the tractor and the side-delivery rake. Production costs are reduced also by the use of better seed and more fertilizer, and by the more scientific handling and feeding of livestock. In the Southeastern States yields of both corn and cotton have been greatly increased through the use of winter legumes.

Long Life Probable for Family Farm

In certain areas mechanization has greatly increased the size of farms and the investment per farm. It has been suggested that this development may foreshadow an increase in corporation farming as distinguished from family farming. Mechanization, however, does not necessarily involve corporation farming or absentee ownership. It is quite consistent with the family-sized farm, though it may make that farm larger. Much interest has been manifested since 1920 in large-scale farming, corporation farming, "chain" farming, and the like. A few conspicuous developments have taken place. But the movement toward the consolidation of holdings and toward farm operations on a large scale has not gone far. For the present, the subject is interesting mainly in its potentialities.

Large-scale farming as yet is a very minor thing in American agriculture. The capital value of all corporation farms that made income tax returns in 1924 was only 2.7 per cent of the total capital value of all the farms of the Nation. Some increase has taken place since 1924 in corporation farming, but the developments have not been spectacular. More remarkable is the change that has taken place since the war in the size of the family-farm unit, particularly in the Great Plains and in the newer cotton areas. The same tendency, though less pronounced, is evidenced in parts of the western Corn Belt. By enabling the family labor supply to cover more land, power machinery tends to conserve rather than to destroy the family-farm system. Long life is probable for the family-sized farm because the nature of farming does not admit of the standardization necessary to the economical employment of large labor forces. Farms have increased in size in the United States in recent years without any corresponding increase in the amount of human labor employed per farm, but rather with a tendency in the opposite direction.

CROPS OF THE YEAR

Fall rains ended drought in most of the States that were drought stricken in 1930. But the winter was remarkably dry. Precipitation was less than half the normal over a large central northern area between the Lake region and the Rocky Mountains. Snowfall in the western mountains was so deficient that the supply of irrigation water was much reduced. On many western mountains the stored snowfall at the end of the winter was the smallest in 20 years. Rainfall in the spring months was generally sufficient, except in the Dakotas and Montana and in some districts further west. Only about half the normal rain fell in the Dakotas and Montana during the three spring months. Some parts of the more western States fared little better. This was North Dakota's third and Montana's fourth successive year of subnormal moisture. Minnesota had a deficiency also. In fact, the moisture supply in that State has been somewhat deficient every year since 1919. Good spring rains fell, and favorable temperatures prevailed in the Eastern States from New England to the Gulf of Mexico. The central valleys, though somewhat drier than usual, had enough moisture for satisfactory crop growth. In parts of the South, particularly in the Southeast, the weather was too dry in June, and the moisture supply continued short in the Northwest and Western States. Elsewhere June weather was favorable, and crops made good growth. July brought general relief to many southern localities that had previously been short of moisture, and also favorable rains over a wide belt from the middle Mississippi Valley eastward to the Atlantic Ocean where the 1930 drought was most severe. In this area the contrast between July rainfall in 1931 and July rainfall in 1930 was striking. In some States it was several times greater this year than last. Weather conditions were unusually favorable for maturing and harvesting the winter-wheat crop. In the spring-wheat States, however, heat and continued drought took heavy toll of wheat and severely damaged cultivated crops and pastures. Rainfall was insufficient for pastures over large areas of the interior valleys and in the Northwest, and also in the western grazing sections. Hay production was reduced. In the Southern States, on the other hand, moisture and temperature conditions continued favorable.

Principal Crops

The United States this year produced large crops of cotton, tobacco, and winter wheat, and short crops of hay, spring wheat, and flaxseed. There were no pronounced deficits or surpluses of the other staple crops. Apples and peaches were produced in abundance. Crops with large acreages in the West suffered greatly. Ample winter and early spring rains, followed by a dry growing season, were ideal for winter wheat, cotton, and tobacco. In the area that was drought stricken in 1930, only Montana, Wyoming, and western North Dakota suffered again this year. The Ohio-Mississippi River area had abundant rain.

Acreage

Abandonment of fall and winter sown crops was small, and the spring was favorable for planting and seeding. On July 1 the area available for harvesting totaled 360,784,000 acres, 0.2 per cent less than the harvested acreage of 1930. Hundreds of thousands of acres were subsequently abandoned in the drought areas of the Western States. Abandonment of cotton acreage, however, was much below the average. In consequence, the total acreage of crops harvested was only slightly less than in 1930. Corn planting increased 4.1 per cent; oats, 2.8 per cent; tame hay, 0.9 per cent; potatoes, 10.7 per cent; and sweetpotatoes, 20.6 per cent. Cotton planting decreased 10 per cent; barley, 1 per cent; flax, 15.2 per cent; tobacco, 1 per cent; and wheat, 4.7 per cent. The shift from cotton and wheat to feed crops was logical in view of the prevailing low prices for wheat and cotton and the short production of feed crops in 1930. Expansion in the acreages of vegetable crops for shipment and for canning was checked. Truck crops for table decreased 1 per cent and those for canning 18 per cent.

Cereal and Other Food Crops

A very large crop of 775,000,000 bushels of winter wheat overshadowed a near-failure crop of only 109,000,000 bushels of spring wheat, so that the total wheat crop (884,000,000 bushels) was 7.5 per cent above the average of 1925–1929. The winter-wheat crop was 42 per cent greater than the average, while the spring-wheat crop was only 40 per cent of the average. Of the spring wheats, the durum-wheat production of 20,000,000 bushels was less than one-third of an average crop. Spring bread wheats were less than 43 per cent of the average production. Rye, while grown principally in the 1930 drought area, was harvested early and produced 36,200,000 bushels, as compared with an average production of 46,100,000 bushels.

Rice production was 41,700,000 bushels—800,000 bushels greater than the 1925–1929 average. The buckwheat crop of 10,600,000 bushels was much above the last year's short crop of 7,900,000 bushels, but 21 per cent below the 5-year average. A crop of 20,000,000 bushels of dry beans was less than last year's large crop but still above the 18,400,000-bushel average. Cowpeas, an important food crop in the Southern States, were in abundant supply. Peanut production was 929,000,000 pounds, as against an average of 796,000,000 pounds. Sorghum for sirup yielded 24,400,000 gallons, nearly double the 1930 production and 85 per cent of the average. Sugarcane acreage was increased, but the yield per acre was low, and the production of 19,100,000 gallons of sirup was 10 per cent less than average. The sugar-beet crop was about average.

Cotton

The cotton crop was estimated on October 1 at 16,284,000 bales. At this figure it is the second largest ever produced. The largest was grown in 1926, when 17,977,000 bales were ginned. There was a production of 16,135,000 bales in 1914. This year's crop is 6.7 per cent above the 1925–1929 average of 15,268,000 bales. Acreage planted to cotton was 10 per cent less than in 1930, but abandonment was light, and the acreage left for harvest was 40,889,000—greater than the acreage harvested in any year prior to 1924, but 9 per cent below the 5-year average. Almost ideal weather conditions in all parts of the South, and below-average weevil infestation, more than offset the reductions in fertilizer applications. The yield per acre was 190.5 pounds, the greatest since the record yield of 209.2 pounds per acre in 1914. Yields per acre were well above average in every cotton producing State.

The Feed Crops

The combined production of the major feed grain crops—corn, oats, barley, and grain sorghums—was 103,000,000 tons. This was a production 14 per cent greater than in 1930, but 5 per cent below the annual average in the 5-year period 1925–1929.

The corn crop was estimated at 2,703,000,000, bushels, which is practically equal to the 5-year average production. The crop was short from Michigan, Iowa, Nebraska, Kansas, and Oklahoma west to the Pacific, the shortage varying from 3 per cent in Oklahoma to 70 per cent in South Dakota. In the remainder of the country it was generally above the average.

Oat production was 1,174,000,000 bushels, 14 per cent less than in 1930 and 11 per cent below the 5-year average. Dry, hot weather at ripening in July accounted for the reduced yield. Exceptionally low yields were recorded in the Dakotas, Montana, and Wyoming, with low yields in a group of neighboring States from Wisconsin to Nebraska and west. On the other hand, heavy yields were harvested from Missouri and Kansas south to the Gulf.

A large proportion of the country's barley crop is grown in the States that suffered from drought. The yield per acre was only 16.9 bushels, as compared with 5-year average yields of 25.9 bushels. Only 216,000,000 bushels (82 per cent of the 1925–1929 average production) was produced on an acreage 25 per cent above the 5-year average.

Grain-sorghum production in the Southwestern States was estimated at 129,100,000 bushels, half again as large as in 1930 and 3 per cent above the 5-year average.

The hay crop was short. Production was 88,400,000 tons, as compared with 89,600,000 tons in 1930 and a 5-year average production of 107,500,000 tons. The wild-hay crop was cut to two-thirds of the average, and the alfalfa crop was much below the average. There was extensive killing of the new seedings of clover and other grasses in the 1930 drought area. The effect on the 1931 crop was counteracted as to quantity by the use of emergency hay crops. The coarse nature of some of these emergency hays and a heavy admixture of weeds in clover and timothy meadows, lowered the quality of the crop materially.

The supply of feed grains is supplemented by cottonseed and linseed meal and wheat by-products, and in exceptional years, like 1930, by the feeding of wheat. This year production of cottonseed meal will be large. Of linseed meal, however, the production will be small. The supply of bran and middlings should be well up to the average. Products supplemental to the hay crop will be in smaller supply. Corn, grain sorghums, and sorgo (sweet sorghum) forage will be somewhat more plentiful. The carry-over of old hay, which was large a year ago, was very small this year, and grain pastures are neither so plentiful nor so productive as they were last year.

Tobacco and Flax

A new record in tobacco production appears to have been set. The crop was estimated in October at 1,661,000,000 pounds. This is slightly larger than the 1930 crop, the largest previously, and 22 per cent above the average production during the previous five years. The season was favorable, and a slight decrease from the 1930 acreage was more than offset by increased yields. Burley-tobacco production (468,000,000 pounds) was more than 70 per cent above the 5-year average. The production of flue-cured tobacco, at 694,000,000 pounds, was much below the production last year, but slightly above the 5-year average. Fire-cured tobacco, 207,000,000 pounds, was 26 per cent above the average. Final yield and production figures will depend upon shrinkage in curing. The curing season in 1931 was generally favorable.

The flax crop was grown in the 1931 drought area. It totaled only 11,500,000 bushels—barely half a crop. Average production is 20,900,000 bushels. The quantity, including imported seed, used in crushing in the United States has averaged about 39,000,000 bushels in recent years. The yield on planted acreage in North Dakota was only 2.7 bushels, and for the United States only 3.7 bushels.

Fruits and Vegetables

Fruit production was ample. Of the five principal fruits, apples and peaches were each more than one-fourth above the 5-year average; pears were one-tenth above it; orange production was about the average; and only grapes were below the average. The production of these five fruits combined was about 10 per cent greater than the 5-year average and about 17 per cent above the production in 1930. The apple crop was reported at 223,000,000 bushels, with a commercial crop of 37,600,000 barrels. In the two principal apple-producing States, Washington and New York, the crops were about equal to the average of recent years. In the central area from Pennsylvania, Maryland, Virginia, and North Carolina west to Michigan, Illinois, Missouri, and Arkansas, the crop was from 50 to 150 per cent above the average. The production of peaches was about 78,000,000 bushels, a new record. Home canning was stimulated by low prices, but large quantities of peaches were allowed to go to waste for lack of a market.

The pear crop of 24,000,000 bushels was 13 per cent less than the record 1930 crop, though 9 per cent above the 5-year average. Just as in the case of apples, it was the central group of fruit States, rather than New York and the Pacific Coast States, in which production was held above the average.

The grape crop in California was greatly reduced by drought, heat, and insect damage. It was only 1,300,000 tons, as compared with an average production of 2,200,000 tons. New York, Pennsylvania, Ohio, and Michigan—the leading grape States of the East—had crops ranging from 8 to 50 per cent above the average. Total grape production was about three-fourths of the 5-year average.

The crop of prunes in the Pacific Coast States was much below the 1930 crop, but just about equal to the 5-year average consumption of both fresh and dried prunes. The crops of oranges and grapefruit in Florida are estimated at about one-fifth less than the large crop of 1930. California citrus production will probably be about the average. A large crop of cranberries was harvested.

The production of potatoes amounted to 375,000,000 bushels, about 9 per cent greater than in 1930, but about 2 per cent less than the average crop. The yield per acre was 106.9 bushels—3.3 per cent below the 10-year average. The area planted was 3,506,000 acres, or 4 per cent greater than the average acreage from 1925 to 1929.

The crop of commercial early potatoes was about 46,000,000 bushels, greater by 3,000,000 bushels than in 1930 and 7,000,000 bushels above the 5-year average. In 19 surplus late-potato States, the production of 255,000,000 bushels was 9 per cent greater than in 1930; in 16 deficit States, production was 3 per cent more than last year.

The sweetpotato crop was hurt by dry weather in September, but the acreage was much greater than in 1930, and the production was 77,000,000 bushels, or 15,000,000 bushels greater than in 1930 and only 3,000,000 bushels less than the 5-year average. The production of cabbage, onions, and tomatoes for canning was considerably below that of 1930.

WHEAT SITUATION

This has been a disastrous year for wheat growers, but the first seeds of the trouble were planted many years ago. They were wheat seeds and led to world-wide overproduction. When the war deprived Russia of its customary wheat market in western Europe and also curtailed all European wheat production, the wheat industry was enormously stimulated in the United States, Canada, Argentina, and Australia. As already noted our own wheat area decreased after the war but rose again to 61,464,000 acres in 1929, and was only about 6 per cent below that figure this year. In Canada, Argentina, and Australia, after a spurt during the war period and a temporary decline afterwards, wheat acreage climbed similarly. The aggregate increase for these three countries between 1924 and 1929 was no less than 10,000,000 acres. Russia began expanding its wheat acreage in 1923 and reentered the world's wheat market in 1930 with a wheat production equal to or greater than its pre-war production. The wheat area in Russia harvested in 1931 was officially reported to be 92,400,000 acres, an increase of 8,600,000 acres over the 1930 wheat acreage. Including the estimated production of Russia but not that of China, the world's wheat output in 1930 was nearly 4,900,000,000 bushels, as compared with a pre-war record of about 4,100,000,000 bushels in 1913.

Seldom has a more extreme example of overproduction existed in modern agriculture. It is a cumulative, and not merely a seasonal, condition. This is shown by the mounting world carry-overs, which demonstrate that more wheat is produced annually than is consumed

annually. On July 1, 1931, the world carry-over of wheat was estimated at 679,000,000 bushels, as compared with 578,000,000 bushels on July 1, 1930. These figures include, for the United States, an item not formerly included, namely, an estimate of wheat stored by mills for other interests. Leaving out this item, and estimating the carry-over on the old basis, the world's carry-over on July 1, 1931, was 659,000,000 bushels, as against 569,000,000 bushels on July 1, 1930.

World production of wheat this year will be less than last year's, but the difference will not make a large cut in the carry-over into next year. As now estimated, world wheat production for 1931 is reckoned at from 200,000,000 to 300,000,000 bushels less than the output in 1930. This country's crop shows an increase (884,280,000 bushels, estimated on October 1, as against 863,430,000 bushels harvested in 1930); but the production is lower in Canada, Russia, Argentina, Australia, and parts of Europe. The Northern Hemisphere (outside Russia and China) has an indicated output of 3,250,000,000 bushels, as against a harvested production of 3,314,000,000 bushels in the same area last year. Relative to the reduced demand by importing countries, the world's wheat surpluses this year have thus far been more burdensome than they were last year.

World Consumption of Wheat

Many farm commodities are low in price just now because demand has fallen. The demand for wheat has fallen too, because importing countries lack the purchasing power to maintain their imports at the usual level. But wheat consumption has not declined as much as the consumption of some other farm commodities. In hard times poor people eat relatively more cereals, and cut down on other things. World consumption of wheat has grown steadily in the last 10 years. In the 1930–31 season, total apparent disappearance of wheat outside Russia and China (for China consumption statistics are not available) was 3,800,000,000 bushels, as compared with only 3,200,000,000 bushels in 1921–22, and also in 1922–23. The consumption in 1930–31, a depression year, was well above that of the preceding year, and about equal to that of the highly prosperous season 1928–29.

The main trouble with wheat has not been a declining consumption but a too rapidly mounting production. This conclusion is not set aside by the fact that the world's wheat output this year will be somewhat less than it was in 1930–31. It is the trend that counts. Wheat growers are suffering from the maladjustments of two decades. The burden falls heaviest on the wheat-exporting countries. Wheat-deficit countries can protect their wheat growers by tariffs, embargoes, and milling restrictions.

In the years of industrial expansion and thriving trade that preceded 1930, the weakness of the world's wheat industry was masked. Prices were high enough to keep poor land in production, and to make good land profitable. In the seven years ended July 1, 1930, No. 2 hard wheat at Kansas City averaged $1.28 a bushel. Despite warnings, farmers thought they were safe in expanding their production. They attached insufficient importance to world-wide increases in wheat acreage and in wheat carry-overs, and to the import-restriction policies that betokened distress in wheat-deficit countries. Economic depression brought the underlying trouble to a head. The combina-

tion of world overproduction and business depression resulted in extremely low prices. For the United States as a whole, the farm price of wheat as of October 15, 1931, was only 36.1 cents a bushel, as compared with 65.6 cents on October 15, 1930. There was some recovery in October and early in November. In the pre-war period 1910–1914, the average farm price of wheat was 88.4 cents. Farm expenses of production and living costs are much higher than they were before the war. Debt and taxes are much greater. Hence prevailing wheat prices are literally ruinous.

United States Farmers Aided by Farm Board

Our own wheat farmers suffered less than those of the other principal wheat-exporting countries in the wheat-price slump, because from the middle of November, 1930, to the middle of June, 1931, the Federal Farm Board maintained prices in the United States at a level well above the world market. No Government agency, however, can support wheat prices indefinitely against pressure of the sort that has come against them in the last two years. Surplus production and lack of purchasing power in the principal importing countries make an insuperable obstacle. Therefore it is encouraging to note that various countries are beginning to reduce their wheat acreage. The wheat acreage was reduced this year in the United States, Canada, Argentina, and Australia. Though the reductions were brought about partly by adverse weather conditions at seeding time, the price situation was not without influence. Russia shows no disposition to join the movement. Wheat growing in Russia, moreover, is carried on in such a way that plantings do not respond to world prices as do plantings in other countries. This is a factor with which wheat growers in all other countries must deal. It means that their readjustment problem will be more difficult than it would be if Russia could be counted on to behave as other countries do when markets fall. But no country can continue to produce for export indefinitely at a loss. Russia, too, must eventually count all its costs of production. It is not probable they are less than those of the more favorably situated wheat-producing areas elsewhere. In the United States it seems desirable further to reduce the acreage in wheat in all areas where costs of production are relatively high. When surplus stocks have been absorbed and excess acreage withdrawn from production, and when various elements in production costs and handling costs have been adjusted to the prevailing lower price level, our wheat industry should again be prosperous though reduced in size.

COTTON SITUATION

Cotton prices fell at the beginning of the 1931–32 season to the lowest point touched since 1898, with no proportionate decline in the farmers' costs of production. As a result, the situation of the cotton growers became as serious as it had ever been in the history of the country. The difficulty sprang from circumstances long in preparation, as well as from the prevailing world depression. About 10,000,000 acres were added to the cotton area of the United States after the war, and methods were developed for combating the boll weevil. The increased acreage, combined with increased yields per acre, enabled the United States to produce large cotton crops under average

conditions. In exceptionally favorable seasons, it produced cotton excessively.

Meantime foreign countries, responding to the stimulus of the previous cotton shortage, expanded their production. India, Egypt, and Russia enlarged their output greatly, and other countries began growing cotton. Foreign cotton spinners encouraged these developments, which coincided for some years with large world consumption. Hence the cotton market did not feel any depressing effect immediately. But the inevitable reaction was merely postponed. Despite an increased industrial demand for cotton in the United States, more than half the American crop had to be sold abroad. It came into competition with cheaper foreign cottons, which foreign spinners purchased in an increased proportion to their total requirements. When importing countries reduced their takings on account of disturbances in the market for cotton goods, it became apparent that cotton growing was over-expanded. Great Britain, the largest foreign consumer of American cotton, lost trade in cotton manufactures owing to the development of cotton-textile manufacturing in other countries, and also as a result of the Indian boycott on foreign goods. Some of the countries that expanded their cotton-textile manufacturing specialized in the cheaper foreign cottons, to the obvious injury of our cotton export trade.

Downturn Preceded Depression

These influences had noticeable effects nearly a year before the present world depression started. Cotton exports from the United States fell off in the latter part of the 1928–29 cotton marketing season. Germany's textile industry, which had been fairly active, became almost as depressed as Great Britain's, and textile manufacturers in other countries of central Europe found the going hard. It is thus evident that the slump in the world's trade in 1929 did not cause, but merely accentuated a disparity between the production and the consumption of cotton. World consumption of cotton at the rate attained in the postwar period of industrial activity could not last, because it was not backed up by sufficient buying power in the cotton-importing countries. Europe in particular could not export enough goods to pay for its imports, and the balance had to be struck in credit. When this could no longer be satisfactorily done, cotton consumption had to decline. Economic difficulties elsewhere made matters worse. China's demand for cotton was restricted by the fall in the purchasing power of silver. Russia, which for some years had imported American cotton, is using home-grown cotton almost altogether and during the past season had some left for export. Cotton consumption dropped everywhere as the depression gathered force, and cotton stocks accumulated.

Prices naturally declined. In order to check the movement the Federal Farm Board formed a Cotton Stabilization Corporation, which bought and stored about 1,300,000 bales of cotton. The Farm Board also loaned money on cotton to cotton cooperative associations. Nevertheless Middling ⅞-inch cotton at the close of the 1930–31 season sold, at 10 principal markets, at an average price of less than 8 cents per pound. For the entire 1930–31 season the price at these markets averaged 9.61 cents per pound, as compared with 15.79 cents in the

1929–30 season and 19.72 cents in the 1927–28 season. Though the consumption of cotton in the United States increased as the 1930–31 season progressed, total domestic consumption for the season was only 5,271,000 bales, as against 6,106,000 bales in 1929–30 and 7,091,000 bales in 1928–29. Exports of cotton in the United States in the 1930–31 season were only 6,760,000 bales, as compared with 8,044,000 bales in the 1928–29 season. Foreign cotton consumption did not improve in the early months of the present season, which began with a world carry-over of American cotton that was the second largest on record. The supply for the 1931–32 season is well above the previous record supply of 1926–27 and more than twice as large as the world's consumption of American cotton in 1930–31.

Farmers Were Forewarned

This disastrous situation did not fall upon the farmers without warning. In the fall of 1930 the Department of Agriculture issued a special outlook report for the Southern States in which developments affecting the cotton situation were considered in detail. The report drew attention to "certain long-time developments which may necessitate adjustments in production over a period of years." It urged the advisability of considering the problem before adjustments were forced upon the country. This recommendation, with various facts about cotton conditions at home and abroad, was carried to farmers through Federal, State, and private agencies. Acreage planted to cotton in 1931 was reduced, as were production costs. Though the acreage reduction did not suffice to strengthen the cotton market, or the reduced expenditures to make the crop profitable, it indicated a definite response to "outlook" information.

In adjusting the production of cotton to market requirements, there is no question of withdrawing from the foreign market. American growers can compete with foreign producers, and cotton is generally more profitable or less unprofitable than other crops that can be grown in the South. During the first rapid spread of the boll weevil, this country's power to retain its position in the world's cotton trade was questioned. It has since demonstrated its ability to hold its place in spite of the boll weevil, and in the face of increasing foreign competition. The immediate need is not further evidence that cotton can be grown abundantly in the United States, but more attention to means of reducing production costs and improving the quality of the crop, while at the same time its volume is adjusted more nearly in harmony with the world's demand. Land that can not grow cotton profitably under average conditions should be eliminated from cotton growing. Efforts should be continued to improve the staple and the spinning qualities of cotton. The department is conducting research on these and allied problems. Further study should be given to the problem of making premiums for superior cotton available to growers at country markets. Substantial progress in this direction has been made in recent years, through the work of public agencies and farmers' cooperative associations.

LIVESTOCK SITUATION

Livestock producers at the beginning of 1931, like the producers of other agricultural commodities, were faced with the problem of marketing their products under adverse conditions. With domestic and

foreign demand greatly reduced, sharp price recessions were necessary to move the market supply of meat.

Supplies of livestock, other than sheep and lambs, marketed during the year were not excessive for normal conditions, but as a result of the reduced consumer demand, returns to producers for all classes of livestock were much smaller than those of 1930 and were probably the smallest for any year since 1911. The total live weight of livestock slaughtered under Federal inspection during the first half of the year, amounting to 10,333,000,000 pounds, was only about 2 per cent larger than the relatively small volume slaughtered during the corresponding period in 1930, but the total amount paid by slaughterers for such stock was 28 per cent less.

In other words, total expenditures by slaughterers for these animals dropped from $1,006,000,000 during the first half of 1930 to $723,000,000 during the first half of 1931. Of this reduction of $283,000,000, about $150,000,000 was on hogs, $112,000,000 on cattle, $12,000,000 on sheep and lambs, and $9,000,000 on calves. Farm prices of livestock in August averaged 23 per cent lower than those of a year earlier, whereas grain prices were down about 47 per cent, cotton prices 44 per cent, prices of fruits and vegetables 35 per cent, and those of dairy products 26 per cent.

Cattle numbers on farms have had an upward trend since 1928 but 1931 was the first year since 1926 in which cattle and calf slaughter was larger than in the previous year. During the first half of 1931, 2.8 per cent more beef and 7.4 per cent more veal were produced under Federal inspection than in the corresponding period in 1930; steer slaughter, amounting to 2,151,000 head, increased by 155,000 head, or 8 per cent. Low prices caused the holding back of many cows that would normally have been marketed, and cow and heifer slaughter, totaling 1,625,000 head, fell off 100,000 head or 6 per cent. The ratio of steer slaughter to total slaughter was relatively higher in June than in any previous month of the year, indicating that reduction in dairy herds by slaughter was still relatively light. Midsummer reports from dairy men indicated that the supply of such cows going to market during the last half of 1931 would be considerably larger.

Declines in Livestock Prices

From the first week in January to the last week in May the decline in the weekly average price of different grades of steers at Chicago amounted to $5.50 per hundred pounds on choice, $4 on good, $2.40 on medium, and $1.60 on common. An unusually high percentage of the better grades in the supply tended to accentuate the decline on these grades. The average price of slaughter cattle during the first six months of 1931 was $6.61, as compared with $9.74 and $11.04, respectively, during the corresponding periods of 1930 and 1929. The average price of calves was $7.88 during the first half of 1931, while it was $10.85 and $13.17 in the corresponding periods of 1930 and 1929.

Prices of the better grades of steers and heifers advanced materially between the first of June and the end of August, but prices for the lower grades of cattle were only slightly higher at the end of this period than at the beginning. The decline in stocker and feeder prices in June, when stocker and feeder shipments into the Corn Belt were the smallest for the month in at least 13 years, reflected a widespread lack

of confidence in future cattle prices, poor pastures in the Middle West, and poor range and feed prospects in some Western States. As a result, the estimated number of cattle on feed in the Corn Belt on August 1 was 13 per cent smaller than on that date in 1930. With two years of unprofitable cattle feeding to look back upon, Corn-Belt feeders reported a considerable decrease in the number of cattle they expected to purchase in the fall of 1931 despite the prospects of a large supply of cheap feed. It is probable, however, that the August advance in the prices of the better grades of fed cattle will result in a stronger feeder demand late in the season than was indicated by the August 1 report.

Nevertheless, the relative economic position of the cattle industry as compared with that of most of the alternative agricultural enterprises remained as favorable as when prices were on a much higher level. The farm price of beef cattle in July was 66 per cent of the 1925–1929 5-year July average. Corn, butter, and hog prices were 58 per cent, lamb prices 38 per cent, and wheat prices 35 per cent of their respective July averages for that period. In 1930 the per capita supply of beef and veal from total slaughter was the smallest in the 31 years for which records are available. The per capita supply for 1931 will not be materially larger.

Hogs Bring Lower Returns

The number of hogs on farms has declined in recent years. The total of 52,323,000 on January 1, 1931, was about 8,300,000 less than on that date in 1928. Federally inspected slaughter was reduced from 49,795,000 head in 1928 to 44,266,000 head in 1930. Slaughter in the calendar year 1931 may not differ greatly from that in 1930, but the number slaughtered during the crop year ended September 30, 1931, showed a reduction of about 5 per cent. A reduction of 1 per cent in the number of hogs slaughtered under Federal inspection during the first half of 1931 was more than counterbalanced by an increase in the average weight. The total dressed weight of 4,100,000,000 pounds was 1.2 per cent larger than the relatively small production during the corresponding period in the year previous. The average price paid by slaughterers for these hogs was $7.05 a hundred pounds, as compared with $9.90 paid in the first half of 1930. This is a reduction of 29 per cent.

Hog prices declined steadily from October, 1930, to February, 1931. After a temporary seasonal rise in March, the decline was resumed in April and was not checked until early June, when new postwar lows were established despite the fact that slaughter supplies were the smallest for May in five years. There was a reduction of 1,273,000 head in Federal-inspected slaughter during May, June, and July. Yet the summer seasonal rise in hog prices was relatively small, and was completed by August 1. Prices declined sharply through that month and at the beginning of September were at the lowest level since 1908. Nevertheless the relationship of feed prices to hog prices continued favorable for hog feeding, and the 1931 spring pig crop was increased 2.5 per cent. A large increase in the fall crop was indicated.

Foreign demand for hog products was relatively weak. Hog producers in central Europe and Denmark have greatly expanded their pro-

duction in recent years. Although total exports of hog products in 1930 were smaller than in any previous year in the present century, a further reduction occurred in 1931. Exports of lard in the first half of the year were 18 per cent smaller and those of pork 47 per cent smaller than in the first half of 1930.

Record Slaughterings of Sheep

Sheep on farms in the United States have increased in number every year for the last nine years. At the beginning of 1931 the country had the largest number of sheep and lambs on record. There were approximately 16,000,000 head more on January 1, 1931, than on January 1, 1922, the low point in the present production cycle. This was an increase of 44 per cent. During the last seven years the estimated annual lamb crop of the United States has increased about 1,500,000 head each year. The total of 31,684,000 head, estimated in 1931, was almost 10,000,000 head larger than the crop of 1925. Inspected slaughter increased about 53 per cent between 1922 and 1930, or from 10,929,000 head in the former year to 16,696,000 head in the latter. Because of population growth, however, the per capita supply of lamb and mutton increased only from 5 pounds to 6.6 pounds, or only 32 per cent. New high monthly record slaughterings under Federal inspection have been made in every month but two (November, 1930, and March, 1931) since January, 1930. Per capita consumption during 1931, however, will probably be somewhat smaller than the record of 8.1 pounds in 1912.

Despite increasing market supplies each year, sheep and lamb prices remained relatively high from 1922 to 1928 inclusive. In April, 1929, however, a sharp downward trend began, which was not checked until October, 1930. Prices were fairly stable during the last three months of 1930, and advanced moderately during the first three months of 1931. The trend has been downward since April. Farm prices of lambs in July were lower than in any other July since 1911. Farm prices of sheep in July were the lowest for any month since records of farm prices were started in 1910. Market prices for aged ewes were so low that returns would sometimes barely cover marketing costs. Large numbers of such ewes were held back, and lambs made up an unusually large proportion of the slaughter supply.

Wool

The wool clip of the United States increased in 1931 to 368,000,000 pounds, or 7 per cent more than in 1930. Preliminary estimates indicate that the world clip for the year will be almost as large as the record clip of 3,210,000,000 pounds shorn in 1928. World stocks of wool are large. Wool consumption by woolen mills in the United States during the first half of 1931 was considerably larger than in the first half of 1930, but no significant increases in consumption have yet been reported by mills in European countries. A downward trend in wool prices started in 1928. It continued with few interruptions into 1931. Recently increased activity in the wool-textile industry of the United States has brought a strengthening of domestic wool prices.

DAIRY SITUATION

The sharp declines in prices of dairy products which began late in 1929 continued well into 1931, and incomes from dairying were drastically cut. This situation obliged dairymen to consider their production programs carefully and to undertake desirable readjustments. From its nature, however, the dairy industry can be readjusted to changing market conditions only very slowly, and production is still high. For quick relief dairymen are doing what they can to reduce their costs and to develop supplementary sources of income. Meantime they are instituting long-time production adjustments by culling out low-producing animals, and by decreasing the proportion of heifers in their herds. Though this procedure may not have noticeable effects on dairy prices for some time, it is permanently constructive and will unquestionably have important beneficial results eventually.

The number of dairy cows in the United States has increased gradually since 1900. There were 2.4 per cent more milk cows on farms on January 1, 1931, than a year earlier. Moreover, the number of yearling heifers exceeded the number required for normal replacement. Nevertheless the prevailing low prices for dairy products may bring about substantial readjustments. As already noted, dairymen show a disposition to raise fewer dairy heifers. The ratio in 1931 of heifers 1 year and 2 years old to the number of dairy cows decreased. This decrease was a reflection to some extent of the unsatisfactory price situation. The number of dairy cows on farms will probably not increase as greatly in the near future as it has done in the recent past.

Other Readjustment Possibilities

Other readjustment possibilities exist. Dairy production depends materially on the relation between feed prices and the prices of dairy products. Just now feed prices are low as well as the prices of dairy products. Hence, the relationship is still not unfavorable to dairy production. Improvement in grain prices, however, would soon make it less favorable. Another possibility of change lies in the fact that dairying is very closely associated with beef-cattle production in certain parts of the country. Indeed a large part of our total dairy output comes from areas that draw no sharp line between dairy cattle and beef cattle. When the beef-cattle industry is depressed, dairy output in these areas increases. With improvement in the beef situation, a shift in the opposite direction takes place. Slaughter of dairy cows and heifers was relatively low in the first half of 1931. Recently it has increased. Reduction of dairy herds by slaughter should strengthen the dairy industry materially. As other branches of agriculture come into a better relationship to their markets, pressure upon dairying will be relieved. Such pressure is heavy in periods of depression because dairying more than any other farm enterprise is resorted to as a source of cash income to meet current expenses.

Until the onset of the depression in 1929, the demand for dairy products in the United States had risen quite steadily for a number of years. Since then it has fallen off. Consumption of fluid milk has dropped, and consumption of manufactured dairy products has not increased appreciably despite heavy price declines. The dairy surplus has gone mostly into butter, and the butter markets have carried much

of the burden. Butter production in 1930 was not excessive because of the drought. In fact it barely equaled the production of 1929. In the early part of 1931 butter production was unusually heavy. It declined somewhat during the summer months, during which period drought again prevailed in some important butter-producing areas. Total production of all manufactured dairy products this year has been somewhat less than it was in 1930. Hence, the underlying supply and demand situation suggests improvement.

Reserve stocks of dairy products have been reduced greatly. Cold-storage supplies of butter and American cheese on September 1 were the lowest for that date since 1923, and stocks of condensed and evaporated milk held by manufacturers were the lowest for that date in the last three years. This decline in current supplies tends obviously to support the dairy markets, but in the conditions now prevailing it is not doing so to the degree that it would in better years. One cause is an extremely conservative buying policy among the distributors of dairy products, who do not know how consumption might be affected by price advances. Improved business conditions would undoubtedly cause an increase in the consumer demand for dairy products; but in the present condition of the dairy industry such an increase could easily be offset by an increase in dairy production. Improvement depends largely on the restoration of better demand conditions. Production power is so elastic, however, that much depends on action taken by the dairy industry. With the number of dairy cows increasing, it is comparatively easy to expand dairy production. Restraint is necessary if the dairy industry is to improve when business and agriculture generally improve.

POULTRY SITUATION

Poultry men faced unusually perplexing problems. Poultry production gave relatively better returns than egg production. Excessive stocks of eggs were stored in 1930, and egg prices remained low during the storage season. Storage operators lost heavily. In consequence, they followed this year a cautious policy which tended to keep egg prices down. Prices to producers for eggs during the first eight months of 1931 averaged below those for any similar period since 1910. Curtailed hatchery operations reduced the size of the new poultry crop by fully 8 per cent, and there was close culling in farm flocks. The number of laying hens in farm flocks was reduced below the number last year and below the 5-year average for the period 1925–1929. On the other hand, liberal feeding of grain and poultry feed caused relatively high egg production per hen. Total production of eggs during the summer and early fall was heavier than had been expected, and storage stocks of eggs increased. Total stocks of both shell and frozen eggs on September 1 exceeded the 5-year average. Meantime lessened consumer buying power tended to check consumption. As a result the usual fall seasonal rise in egg prices was below normal.

Prices to producers for chickens averaged lower this year than in any year since the war. Feed costs were low, however, and the returns to producers were generally more satisfactory than in other lines. As the year advanced the spread widened between the cost of poultry rations and the market prices of poultry and eggs. Close culling of flocks, smaller farm consumption of poultry, and liberal feeding furnished the markets with a steady supply of poultry, which was exceptionally well

finished. Consumption of poultry was remarkably well maintained, and storage stocks until early fall were relatively light. Poultry prices were profitable to storage operators during the first half of the year. Heavy marketing of poultry developed in July, however, and the market situation became less favorable.

FRUIT AND VEGETABLE SITUATION

Prices of fruits and vegetables this year, with few exceptions, declined to levels much below those prevailing in 1930. Late lettuce was an outstanding exception. Pears, owing to light production, resisted the downward trend fairly well. Potatoes and peaches were extremely cheap. Peach production was a record. Apple production was large, and apple prices correspondingly low. The August forecast indicated the heaviest crop since 1926. Output of cantaloupes and similar melons in eight late-producing States was about 6 per cent more than in the previous season. Grape production, on the other hand, was reduced by hot weather, and was estimated at 28 per cent below the production of 1930. In 10 late-shipping States the output was estimated at about 12 per cent below the production in 1930. Drought conditions in Florida ended in July, and the prospects for oranges and grapefruit in that State improved. In California, though high temperatures prevailed, the fruit was sufficiently advanced in September to prevent shedding or serious injury. Output of watermelons in 16 late States was estimated at 36 per cent more than in 1930. Potato production was substantially larger than in 1930, particularly in the Northeastern States. Sweetpotato production was estimated in August at about 30 per cent above the output of the previous year. Production of onions in 17 States was about 31 per cent less than in 1930. Tomato production in 14 late-producing States was nearly 20 per cent greater than in 1930. Excessive production in many lines and low prices brought about an unusual number of bankruptcies in the fruit and vegetable trade, and net returns to growers were small.

Growers had the advantage of some decrease in fertilizer prices and in wages. On the other hand, diminished demand lowered prices for some of the less desirable sizes of fruits and vegetables to a point below harvesting and transportation costs. Shipments of No. 2 potatoes from the South Atlantic States were relatively small, and the prices received even for No. 1 potatoes were unprofitable to most growers. In the Imperial Valley of California cantaloupe production was enormous, and the quality of the crop was fully up to the average; yet cantaloupe prices were so low that the year was considered the most disastrous in the history of California's cantaloupe industry.

Heavy Losses to Growers

It proved impossible, from the beginning of the season, to realize the costs of packing and marketing small-sized plums on the Pacific coast. The same was true of peaches in Georgia. In both these areas considerable quantities of fruit were not moved. Marketing outlets for canned goods were restricted. Canners and dealers began the season with unusually large carry-overs, particularly of peaches. Accordingly, California canners limited their pack for the current year. This involved heavy loss to the growers. Overproduction of yellow

cling peaches for canning had become chronic in California. Canners' and growers' organizations cooperated this year in a new method of adjusting production to demand whereby marginal orchards were destroyed under an arrangement involving payment at a relatively low rate per ton for fruit on the trees provided the trees were uprooted before the crop was ready for harvesting.

This outstanding example of economic readjustment to market conditions followed recommendations offered four years ago by Federal and State officials. The overplanting of cling peaches was emphasized by the so-called peach war of 1927, in the course of which the entire crop of Tuskenas (Tuscans) was permitted to go to waste while growers and canners argued over prices. When Federal and State officials recommended the systematic removal of enough acreage to bring production into line with the demand, with the operation financed by contributions from the entire industry, the proposal met with much criticism. To-day it is in process of accomplishment. It should enable growers to avoid the usual process of adjustment through bankruptcy and permit the preservation of the better orchards. Similar plans to solve the surplus problem of the grape industry have been under discussion. A remedy is needed urgently because the demand for juice grapes has decreased in the Eastern States and the production of table and raisin grapes has continued to increase. So serious have been the resulting difficulties of the grape industry that many owners have lost their vineyards.

EXPORTS AND IMPORTS

The value of our agricultural exports in the fiscal year ended June 30, 1931, amounted to only $1,038,000,000. This was a reduction of $457,867,000 from the total of the preceding fiscal year, and was the lowest for any year since 1911. In volume our agricultural exports have declined about 25 per cent in the last two years. Most of this decline took place in the 1928–29 season, but meat products suffered most in the 1930–31 season. Exports of fruit products were greatly reduced in the 1929–30 season, but recovered in the 1930–31 season. Exports of tobacco have been well maintained through the depression.

The percentage of agricultural production exported declined between 1928–29 and 1929–30 from 12.2 to 10.2 per cent, and probably declined more in 1930–31. In 1919–20 the United States exported about 17.4 per cent of its agricultural production. The depression in 1921 brought the proportion down to 13.5 per cent. There was some recovery; and in 1924–25 the ratio was 16.1 per cent. Since then the trend has been downward.

Cotton has suffered most from the reduction in foreign demand. Exports of cotton excluding linters declined from 8,520,000 bales in the 1928–29 season to 7,096,000 bales in the 1929–30, season and 7,048,000 in the 1930–31 season. The reduction in volume was accompanied by a much greater reduction in value. In the 1930–31 season the value of our cotton exports was only 56 per cent of their value in the 1928–29 season.

Exports of wheat, including flour in terms of wheat, declined from 163,687,000 bushels in the 1928–29 season to 153,245,000 bushels in 1929–30 and 131,536,000 bushels in 1930–31. The volume of our wheat exports in the 1930–31 season was 14 per cent less than in the

previous season, and the value 38 per cent less. A short corn crop in 1930, as well as unfavorable foreign conditions, resulted in a great reduction also in the exports of feed grains.

Exports of meat and meat products have been greatly reduced. Exports of total meats decreased 35 per cent in the 1930–31 season, as compared with the previous season. The main decline was in pork products. Bacon and Cumberland sides fell off 61 per cent, from 132,967,000 pounds in 1929–30 to 52,412,000 pounds in 1930–31; hams and shoulders dropped 23 per cent, from 130,318,000 to 99,749,000 pounds; fresh pork decreased from 18,768,000 to 11,093,000 pounds, or 41 per cent; pickled pork was reduced by 47 per cent, from 39,809,000 to 21,118,000 pounds. Fresh pork exports were the lowest since 1914–15; exports of pickled pork had not been so small since 1851. The lowest intervening year was 1869, when the amount was 24,000,000 pounds. Exports of bacon were the lowest since 1870, in which year they were 39,000,000 pounds. Export of hams and shoulders were the lowest since 1894, except in 1910–11, when they were 58,000,000 pounds.

Exports of leaf tobacco declined only slightly from 587,125,000 pounds in 1929–30 to 566,036,000 pounds in 1930-31. The decrease was general in all classes except Maryland and Ohio Export, which increased 29 per cent.

Increased Exports of Fresh and Dried Fruits

Considerable increases were recorded in the exports of fresh and dried fruits. Exports of dried apples were 38,121,000 pounds, as against 23,769,000 pounds in the fiscal year 1929–30. Export movement of dried prunes jumped to 296,254,000 pounds from 142,989,000 pounds the previous year. Exports of dried fruits for salads totaled 14,518,000 pounds, as against 1,332,000 pounds the previous year. Exports of fresh apples were 6,780,000 barrels, as compared with 3,426,000 barrels in 1929–30. Exports of fresh pears rose to 134,670,000 pounds, after a decline to 62,024,000 pounds in 1929–30. Exports of oranges and lemons were about the same as in the previous year; and there was an increase of 43 per cent in the quantity of grapefruit exported.

Exports of canned vegetables declined 33 per cent in both quantity and value. Exports of vegetable oils decreased in both quantity and value. Cottonseed-oil exports (crude and refined) fell from 31,998,000 to 26,353,000 pounds, with a decrease of 20 per cent in value; linseed-oil exports dropped from 2,129,000 to 1,298,000 pounds, with a 51 per cent decrease in value; soybean-oil exports were 4,410,000 pounds in 1930–31, as against 5,509,000 pounds in 1929–30.

Imports of agricultural products (excluding forest products and rubber) were reduced in volume and value. For the season July 1, 1930, to June 30, 1931, they amounted to $1,067,000,000, a decrease of 37 per cent from the total of the preceding year. The value was the lowest since 1914–15. Imports of animal products were greatly reduced in both volume and value. The value of imported dairy products was reduced 47 per cent; of imported eggs, 67 per cent; of imported hides and skins, 53 per cent; of imported meat and meat products, 71 per cent; of imported silk, 37 per cent; and of imported wool, 59 per cent.

The quantity of coffee imported increased, but the value decreased. Imports of sugar and tea declined slightly in value. A great reduction

in the value of sugar had taken place before the present depression began. Imports of vegetable oil and oilseed products decreased in value. The volume of the imports of unmanufactured tobacco increased, but a decline in prices reduced the value 21 per cent from 1929–30.

SIGNIFICANT POPULATION CHANGES

Farm population in the United States showed a net increase in 1930 for the first time since 1922, when the department began making annual estimates of the number of people living on farms. From other data it appears that the indicated increase in our farm population last year was the first annual increase in two decades. For January 1, 1931, the estimate of farm population was 27,430,000, as against 27,222,000 on January 1, 1930. During 1930, it is estimated, 1,543,000 persons left the farms, as compared with 1,876,000 the previous year. On the other hand, 1,392,000 persons went from cities to farms in 1930, as against 1,257,000 in 1929. Hence the net movement from farms to cities was only 151,000 in 1930, as compared with from 576,000 to 1,120,000 in the other years since 1921. On farms, however, there is a considerable surplus of births over deaths. The surplus in 1930, it is estimated, was 359,000 persons. Balancing the gains and losses for the year, leaves a net gain in farm population of 208,000 persons.

Unemployment has greatly reduced the flow from farms to cities and has stimulated somewhat the movement of city people in search of the cheaper conditions of livelihood to be found in the country. It is, of course, impossible to say on the basis of the figures for a single year whether or not the tide has turned. Urban unemployment tends to increase the farmward movement, which diminishes again with the revival of industrial activity in cities. Undoubtedly the present trend is fraught with important agricultural consequences. It will increase the difficulty of adjusting farm production to market requirements and will weaken the urban market for agricultural goods. On the other hand it has a good side, for subsistence is more easily got in the country than in the town in periods of trade depression.

Of far greater significance in the long run for American agriculture is the tendency toward a marked decrease in the birth rate in this country and other important industrial countries. In the United States the effect of a declining birth rate is accentuated by restrictions on immigration both directly and through the indirect effects on birth rates and death rates. In the period, 1920–1930, the census reported an increase of about 17,000,000 in our population, or 16 per cent. But the gain was greatest in the early years of the decade. Up to 1923 it was nearly 2,000,000 yearly, after which a steady decline set in. At present the gain is only about 1,000,000 a year. The decrease is attributable partly to a net decline in immigration, partly to a decrease in births, and partly to an increase in deaths. The increase in deaths is due mainly to an increase in the number of elderly people in the population, rather than to a tendency for death to occur at earlier ages. It is estimated that the number of deaths annually will continue to increase because fewer children are being born and fewer immigrants, who are mostly young people, are arriving.

Stationary Population Foreshadowed

From these and other facts, statistical authorities conclude that a stationary population for the United States is only about 30 years distant. Assuming no changes in restrictions on immigration, an increase of about 10,000,000 is expected from 1930 to 1940, of about 7,000,000 from 1940 to 1950, and of only about 4,000,000 from 1950 to 1960. If these estimates prove correct, the population in 1960 will be only about 144,000,000 or about 20,000,000 more than at present.

Significant tendencies exist in urban and rural birth rates. Only four or five of the cities with a population of 100,000 or above have enough children to maintain permanently a stationary population without accessions from the outside. Most cities have only about three-fourths of the number of children necessary to do so. With immigration practically stopped, our cities both small and large depend for their increase mainly on the natural rate of increase of the rural population. Birth rates are declining on the farms as well as in the cities, though not so rapidly. It therefore seems probable that preventing the Nation's population from actually declining may be found to depend on the development of policies that will admit of a large proportion of the population dwelling in a rural environment, even though partly or wholly dependent on nonagricultural employment.

PUTTING LAND TO THE RIGHT USES

Large surpluses of the major farm products point to the probability that for some years little or no expansion of our farming area will be required. For the more remote future the expected drop in the rate of population increase lessens materially the prospective need for additional farm land. The reduced need for new crop and pasture lands and for farm population is emphasized by Europe's striving toward agricultural self-sufficiency. It is also emphasized by increasing foreign competition in the world's agricultural markets. Recent technical progress permits the use of semiarid areas hitherto unsuited for crop production. Increased efficiency economizes both land and labor. Changes in domestic consumption, moreover, are not such as to require a larger crop and pasture acreage per capita.

Whether we consider the foreign or the domestic situation, it seems clear that American agriculture approaches a turning point. There is urgent need to adjust our national agricultural policy, particularly our land policy, to the changing conditions and outlook. Extensive areas of public lands in the United States went into private ownership under the homestead policy during the decade or more beginning in 1913. In the war period, under the influence of high prices, agriculture was further expanded into areas where normal prices could not support it. Although there has been little expansion of our farming area as a whole during the past decade, our 500,000,000 to 600,000,000 acres of unused potential crop land, though mostly of low grade or requiring costly drainage or irrigation, are a constant incentive to overexpansion. Most of the land is in private ownership, and the owners naturally want to get it into use. It would probably be inexpedient and, perhaps, constitutionally impracticable, for the Federal Government to regulate the utilization or settlement of private lands. Much progress, however, could be accomplished through the widespread dissemi-

nation of information concerning the long-time outlook for different lines of production in various parts of the country, and concerning the uses for which particular classes of land are economically adapted. This implies an economic classification of our land resources, which should be readjusted from time to time to conform to fundamental changes in economic conditions. Such a classification would make it easier to discourage ill-advised and unnecessary expansion. It would lessen the risks of new settlement. It would designate land that should be withdrawn from cultivation and land that should be acquired for public uses. It would serve, in short, as the basis of a national land policy.

Replanning of Research Needed

This would require some replanning of the investigational and extension work of the department and the State colleges and experiment stations. Their work would be directed more toward synthesizing research results and coordinating research activities to develop more definite conclusions concerning the economic adaptation of the different kinds of land to various possible uses.

The department has already directed a considerable share of its resources to the study of land utilization. The Bureau of Chemistry and Soils, in cooperation with State experiment stations, is classifying the soils of the Nation and studying their properties. It is investigating the extent, causes, and prevention of erosion. The Bureau of Agricultural Engineering is studying drainage, irrigation, and land clearing. The Bureau of Plant Industry investigates forest pathology. The Bureau of Entomology studies insects that injure forest trees. The Forest Service carries on research in silviculture, forest management, and methods of using timber and timber products; besides administering the grazing facilities of the national forests, it gives attention to problems of range utilization. Recently the Forest Service has expanded its research in the economic aspects of the utilization of land for forestry and grazing. It is studying forest taxation and the disposition of tax-delinquent forest lands. A general inventory is being made of the timber resources of the Nation.

About 10 years ago a Division of Land Economics was established in the Bureau of Agricultural Economics. It has devoted part of its attention to the economic aspects of land utilization. The area of our country is so large, however, that it would have been impracticable for so small a unit to undertake to work out the land-utilization problems of local areas for any appreciable part of the country. A few local studies have been made, mainly with a view to determining the character of the problems of sample areas and developing methods of investigation. The work has been mainly confined to studying the conditions that affect the need for land, and to estimating the extent of the Nation's agricultural land resources available for different purposes.

The time has come when both the Federal Government and the States should devote more attention to the task of determining for specific areas what uses of land are most economical. This is the necessary basis of rural planning. As the proper economic uses of land are determined, a vigorous extension program should be developed to stimulate individuals and communities to adjust their economic life to a sound program of land utilization.

Emergency Conditions Demand Action

Although the attainment of agricultural prosperity will ultimately depend on the development of a more orderly and efficient system of land utilization, it is necessary to approach the problem by dealing with emergency conditions. Economic life in many farm communities has been disorganized by recent changes in the value, utilization, and ownership of land. In some areas many farms have been abandoned. The resources of many communities have been depleted by timber cutting, and unfavorable conditions of the lumber market have reacted on the value of standing timber. As a result, many farmers and holders of timberland can not meet taxes and other carrying charges. Millions of acres of farm or forest land have passed into various stages of tax delinquency. Extensive areas have been taken over by creditors through foreclosure. The fiscal problems of local governments have been intensified, and provisions for schools and other public services rendered uncertain.

In such areas the situation could be clarified through the collaboration of Federal and State agencies in determining the economic outlook for various land uses, and on this basis formulating a program of economic, institutional, and fiscal reorganization. In general, lands now in private ownership should continue to be privately owned and utilized. Where previous conditions have resulted in farms too small or too large for present conditions, reorganization plans should be developed and put in operation with the aid of local business interests and local and national credit agencies.

Utilization By Private Agencies

In certain areas improved methods of forest management, including in some cases the consolidation of scattered tracts and cooperative measures for cutting, handling, and marketing, may permit a profitable utilization by private agencies of timber holdings and wood lots. Profitable private utilization can often be facilitated by changes in methods of taxation or assessment. Probably the Federal Government and the States should assume more responsibility for guiding land utilization and settlement and for determining the feasibility of drainage and irrigation projects. It is probable that assistance may be rendered to farm owners in the more effective disposition of the mineral resources beneath the surface of their farms. It may be desirable gradually to broaden the public acquisition and administration of lands not adapted to private utilization. Recognized objectives in public ownership of land, such as watershed protection, forest demonstration, and the provision of national and State parks and wild-life refuges should not be the only consideration. Other public objectives may well be kept in view. Sparse and scattering occupancy adds to the burden of maintaining schools and other public services. This cultivation of submarginal farm lands increases the competition farmers have to meet, frequently with no advantage to the occupants of the submarginal farms. The maintenance of permanent local forests should be promoted for farming communities needing timber and timber products, raw materials for local industries, local markets, and part-time employment of the population. Lands that can not be privately utilized without excessive soil erosion or

other wastage of natural resources should be removed from private ownership.

The existence of large areas of tax-delinquent land provides an opportunity for broadening the basis of public ownership. Where private ownership is inadvisable, such lands should not be forced into private ownership through resales. What part the Federal Government and the States, respectively, should take in the development of a broader program of public ownership is a matter for future determination. Clearly, however, Federal and State programs of acquisition should be coordinated in harmony with a definite policy of land utilization.

Some Principal Requirements

The central problem is to correct or avoid mistakes in the major uses to which land is put and to safeguard the public interests in the utilization of the land. Summarizing, it seems desirable to—

(1) Encourage farmers who are operating poor land to find better opportunities in agriculture or other occupations. Poor land includes land which, though temporarily adapted to commercial farming, is peculiarly subject to wastage by erosion.

(2) Promote compact communities which will permit maximum economy of schools, roads, and other institutions by encouraging abandonment of areas, especially of poor land, where occupancy has become extremely scattered through abandonment, delinquency, etc.

(3) Create the conditions that will make possible the use for which the land is best adapted, including fire protection for forests, modifications in taxation, consolidation of tracts, and the necessary transportation facilities, and disseminate the requisite technical information.

(4) Insure the maintenance of the forest or range areas requisite for a permanent and stable agricultural economy in regions where agriculture is closely interrelated with forestry, or with use of the range.

(5) Discourage the overexpansion of agriculture.

(6) Prevent the expansion of agriculture into areas poorly adapted for the purpose and the development of a sparse type of settlement that will mean heavy collective costs for public services. This includes discouraging the development of irrigation and drainage by collective action except when agriculturally and economically feasible.

(7) Promote the adjustment of land valuation and the tax burden to what the particular use for which the land is adapted is capable of supporting.

(8) Develop those types of land that will contribute to watershed protection, flood control, adequate provision for future timber requirements, and the protection of range resources.

I consider the land-use program to be of such importance that I have called a national conference of farm leaders to discuss it comprehensively. This conference will be attended by representatives of this department, the land-grant colleges and experiment stations, the Federal Farm Board, State land departments, mortgage companies, farm organizations, railroads, banks, and others.

FARM-LAND VALUES

Developments unfavorable to agriculture during 1930 were reflected by severe declines in farm real-estate values in nearly all parts of the country. Not since 1922 had values dropped in any year to such an

extent as during the year ended March 1, 1931. The index of estimated value per acre for the United States as a whole decreased from 115 per cent of the pre-war level to 106 per cent. The indicated declines were not only more severe than those of the previous year, but also far more general. Only two States escaped reductions in 1930, while in 1924 only 24 had reductions.

The sections reporting the greatest declines in farm-land values, relative to 1930 levels, were the West North Central and West South Central States. Each of these groups of States had declines averaging 11 per cent. The East North Central and South Atlantic groups each reported average declines of 9.4 per cent. The East South Central showed an 8.6 per cent decrease, the Middle Atlantic 4.7, the Mountain States 2, the Pacific States 1.4, and the New England States 0.8 per cent. The States reporting the greatest percentage of decline were Arkansas, North Carolina, Missouri, South Carolina, and Iowa.

Accompanying the downward movement of farm-land values was a general fall in the number of voluntary sales, and a striking increase in the number of forced transactions. During the year ended March 15, 1930, the average number of voluntary sales for the country as a whole was 23.7 farms per 1,000. During the year ended March 15, 1931, the average number dropped to 19 farms per 1,000. Forced sales, on the other hand, increased 25.5 per cent.

An appreciable and rather general demand for farms to rent resulted from the influence of urban unemployment, which caused city people in larger numbers to seek the cheaper food, fuel, and shelter available in the country, and discouraged farm people from moving to cities. Because of the difficulty of financing farm sales, the weak financial condition of the unemployed, and a general disinclination toward buying on a declining market, the accompanying effect on the demand for farms to buy was insufficient either to increase the number of farms sold voluntarily, or to increase appreciably the total number of sales. An increasing proportion of the farms sold voluntarily were bought by men who were formerly tenants, and by nonlocal residents.

Decline Reflects Drop in Earnings

Farm-realty values reflect farm earning power, current and prospective. Hence, the fundamental cause of the decline in farm-property values in 1930 was the slump in farm incomes. As already noted, gross income from agricultural production in 1930 was about 22 per cent less than in the previous year, though the physical volume of production was only about 2 per cent less. It is estimated that farm-operating costs on the other hand declined only from $3,152,000,000 to $2,890,000,000. Wages paid to hired labor declined only slightly and taxes still less. Accordingly, the fall in net incomes was proportionately more than the fall in gross incomes. Net income available as a return for all the capital invested in agriculture, and as a reward for the labor and management of the farm operator and his family dropped to $4,669,000,000, as compared with $6,751,000,000 in 1929.

This net income may be considered from two standpoints. If pay for the labor of the farm operator and his family is subtracted at current wage rates for hired labor, there remains only $573,000,000 as a return for all capital and management devoted to farming. If, on the other hand, adjustments are made for the portion of taxes and operat-

ing expenses paid by landlords, and for payments made by farm operators to nonfarmers for rent and for interest on loans made by them for use in production, the income from production not only fell short by $346,000,000 of paying farm operators and their families a rate of return for their work equal to that paid to hired hands, but also left no return for the farm operators' own capital and management.

The renewed declines in income came at a time when the readjustment following the 1920 depression was still incomplete. Although land values had begun to show some signs of stability, the amount of land in the hands of involuntary holders was still at high levels, forced sales of farm land still held an unusually prominent place in the real estate market, and long-time financing of agriculture was conservative. The development of 1930 and 1931 have aggravated the situation, and reemphasized the importance of rehabilitated purchasing power for agriculture if further liquidation is to be avoided.

Increase in Tenancy

Along with the increase in the holding of land by involuntary holders which has resulted from the decline in farmers' equities has come an increase in the proportion of tenant-operated farms. This proportion was 42.4 per cent in 1930 for the United States as a whole, as compared with 38.6 per cent in 1925. Increases in tenancy were reported in every State except Connecticut, New York, New Jersey, Pennsylvania, Delaware, Arizona, and South Carolina. Relatively small increases in tenancy occurred between 1910 and 1925. Rapid increases followed the depression of the nineties, partly as a result of that depression and partly because the area of good land available for homesteading was diminishing. During the half century that questions on tenure have been included in the Federal census (1880–1930), the percentage of tenant-operated farms has increased from 25.6 to 42.4. The present high proportion of tenant farms may involve significant consequences to the general welfare, and attention may well be directed to the probable social effects.

TAXES

Farm real-estate taxes showed a slight decline in 1930 for the first time in the 17 years covered by the records of this department. Taking farm real-estate taxes per acre in 1913 as a base represented by 100, the index for such taxes was 249 in 1930, as compared with 250 in 1929. In amount the decline was insignificant, but it indicated a halt in the long upward trend. It did not bring any measurable relief to the farmers because agriculture's capacity to carry the burden declined far more. As we know it to-day, the farm-tax problem is largely a development of the last decade and a half. Taxes increased steadily from 1920 to 1929, inclusive, though farm earnings were low and farm valuations persistently declined. The situation was bad enough before the current depression began. It is critical now.

In the main the farm-tax problem rests with State and local governments, which in many instances are recognizing the fact in practical ways. Forty-four State legislatures met this year, and most of them considered taxation in relation to agriculture. Relief measures advocated, and in some cases enacted, fell broadly in two categories: Those designed to shift part of the cost of State and local government from

general property to incomes and other sources of revenue, and those designed to reduce public expenditures. Property taxes rest principally on real estate; hence farmers and other real-estate owners are generally required to pay more than their fair share. This injustice is coming to be widely recognized, and State income taxes are proposed as a partial remedy.

Idaho, Utah, and Vermont this year joined the list of States having personal and corporate income tax laws. Vigorous but unsuccessful attempts were made to introduce the income-tax principle in several other States. Oklahoma's income tax law was made more effective by an increase in the rates. North Carolina, Missouri, and Wisconsin likewise increased their income-tax rates. Several States increased their gasoline taxes. Some of them arranged to apportion part of the new revenue among minor civil divisions to help defray the cost of local roads. Nearly all of the revenue collected in gasoline taxes in 1929 was devoted directly or indirectly to the construction and maintenance of rural roads and city streets.

Legislative Measures Taken

Practically all the States whose legislatures met this year dealt in one way or another with the problem of reducing public expenditures. Various expedients were adopted. Taxing authorities showed themselves keenly aware that a cut in the amount of the tax burden is as necessary as a more equitable distribution of the load. They were particularly impressed with the growth of tax delinquency. Much land over large areas reverted to public ownership through the inability of its former owners to pay the taxes. In northern portions of the Lake States the tax base of many local governments has shrunk so much that the continued existence of these governments is threatened. Inflexible taxes that take no account of crop failures, price declines, and other causes of distress have precipitated widespread farm insolvency. In such circumstances local budgets have to be pared through sheer necessity, and tax systems must be modified and improved.

Taking the country as a whole, the work of tax reform is barely begun. Nearly four-fifths of all State and local taxes are derived from the general property tax. When real-estate values fall as they have done in the United States since the war, assessments decline much less rapidly, and tend to exceed the current selling value of the land. The necessary twofold remedy, consisting of reduced public expenditure and the development of new sources of revenue, should be invoked for reasons of expediency as well as of justice.

AGRICULTURAL CREDIT

Local farm-credit facilities, barely adequate in normal times, were unprepared to handle the situation resulting from the 1930 drought and recent depression in farm prices. Accordingly, Congress passed legislation to supplement existing credit facilities. It appropriated emergency funds the administration of which was placed in the Department of Agriculture. All told, the final session of the Seventy-first Congress assigned $67,000,000 for various forms of agricultural credit. It made $45,000,000 available for loans to farmers who suffered from the 1930 drought. This money was for loans for the pur-

chase of seed, feed for livestock, and fertilizer. An additional $2,000,000 was appropriated for the same general purposes in a specific area that had suffered from storm and flood in 1929. Another appropriation of $20,000,000 was made for agricultural rehabilitation (which term included necessary items for farm production) and for loans to individuals to buy stock in agricultural-credit corporations, livestock-loan companies, and similar organizations. Advances made to assist farmers in the drought-stricken areas are dealt with in some detail later in this report. I shall deal here mainly with the other emergency credit provided to supplement the credit obtainable by farmers from other sources, such as the commercial banks, the Federal land banks, the joint-stock land banks, and the intermediate credit banks.

Though much important Federal legislation affecting agricultural credit has been put in effect during the last decade and a half, agricultural-credit conditions generally were extremely unsatisfactory this year. This was not wholly a reflection upon the existing farm-credit facilities. It resulted largely from the depressed condition of agriculture, which weakened banking institutions. More than 1,300 banks in the United States failed in 1930, and 932 failed in the first eight months of 1931. More bank failures in agricultural areas have taken place in the last few years than in any other previous equal period, though the suspensions this year included an increased proportion of city banks. The injury to agriculture was not confined to the loss of deposits; it included a great shrinkage in the amount of agricultural credit available. When local confidence is disturbed, country banks find it more difficult to draw on the larger money centers. Hence their supply of loanable funds comes to depend almost exclusively on their local deposits, which naturally decline if banking conditions seem insecure. In such circumstances, moreover, country banks are obliged to invest an increased proportion of their funds in liquid assets outside their communities as a protection against unusual withdrawals.

Local Conditions the Controlling Factor

Some idea of the extent to which local supplies of agricultural credit have recently been reduced may be gained from the fact that in the middle of 1931 net demand deposits of member banks of the Federal reserve system, located in places of less than 15,000 population, in 20 leading agricultural States, not including California, were about 20 per cent lower than the monthly average for the period 1923-1925. Mainly this decline reflected reduced income from agricultural production. Ordinarily deposits in country banks are a revolving fund available for local loans. When the liquidation of loans made by the country bank is retarded by farm depression, the fund loses its revolving character, and even good credit risks must be refused. Emergency credit provided by the Federal Government materially relieved this difficulty. As mentioned elsewhere, Federal loans to purchase seed, feed, and fertilizer and for agricultural rehabilitation totaled approximately $47,000,000. In addition the Federal Government advanced $1,327,000 to individuals for the purchase of stock in agricultural-credit corporations and livestock-loan companies. Loans of this type enabled credit agencies that rediscount paper with the Federal intermediate credit banks to expand their credit facilities by several times the amount of the new capital provided. Hence the full benefit of the advances was much greater than might be supposed from their relatively small total.

Advances of this character, as already noted, were provided for in the $20,000,000 appropriation for agricultural rehabilitation and loans to individuals to buy stock in credit institutions. Under congressional authority the Secretary of Agriculture, after conferring with officials of the Federal intermediate credit banks and the Federal Farm Loan Board, set aside $10,000,000 for the latter purpose. A National Advisory Loan Committee, consisting of Lewis T. Tune, chairman, St. Louis, Mo.; B. C. Powell, Little Rock, Ark.; and B. F. Cheatham, Washington, D. C., was appointed to assist in administering the fund. Advisory committees were also appointed in 22 drought-stricken States to make recommendations regarding loan applications. Up to September 1, 1931, advances had been made representing 788 individual loans to stockholders in 49 credit corporations and livestock-loan companies.

Opportunities for Credit Corporations

An important field of usefulness lies open to agricultural-credit corporations in those communities where existing local credit facilities are inadequate. They do not depend for their supply of loanable funds on local sources, but have access to the central money market through their rediscount facilities. Hence they can obtain advances on the basis of actual credit risks without being limited by the necessity of mobilizing funds locally. In 1930 the Federal Farm Loan Board made a regulation authorizing an increase from 2 and 2½ per cent to 3 per cent in the spread allowed agencies rediscounting with the Federal intermediate credit banks. In other words, it permitted rediscounting agencies to charge more for their services and consequently to provide better facilities and better management. With a 3 per cent margin between the rate of interest paid and the rate of interest received, these organizations can function more safely and more efficiently than was formerly possible. This advantage should promote the organization of more agricultural-credit corporations and should help to make capital available to formers more cheaply and more abundantly. Acting through the Federal intermediate credit banks, they can create new channels through which loanable funds may flow readily from the principal money centers to farm communities.

Varying Interest Spread Needed

A given operating spread might be excessive for local credit institutions in some parts of the country and yet prove inadequate in other areas. Under usual conditions, and even more so at the present time, country banks in the South and West must vary from their customary rates in order to take advantage of the rediscount privileges offered by Federal intermediate credit banks. Few bankers have deemed this a feasible policy. Funds of the Federal intermediate credit banks have hitherto reached farmers principally through agricultural-credit corporations and livestock-loan companies. With the year-round volume of business enjoyed by livestock-loan companies, the present 3 per cent operating spread may prove ample. It is doubtful, however, if it will cover the cost and losses incurred in financing the production of those crops which involve a relatively hazardous and costly type of business. In this type of financing loans are so seasonal that credit corporations can actually earn little more than half the annual rate which is charged.

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Limitations on interest rates were authorized by Congress for the protection of farmer borrowers and to prevent exploitation of Federal intermediate bank credit by local credit institutions. The accomplishment in these directions, however, has been overshadowed by the failure of Federal intermediate bank credit to reach farmers in the volume needed. To a considerable extent this appears to be due to the fact that approved spreads have often failed to recognize local operating requirements. In such cases the rate limitations have obstructed the channels through which Federal intermediate bank credit might flow to farmers. A system of spreads, based on variations in local conditions and requirements, would appear to be more practicable than a uniform spread for all areas and types of loans.

Emergency Credit Benefited Many

Congress substantially recognized the principle that agricultural credit should not depend too heavily on local funds when it created the intermediate credit banks. It took an important further step in the same direction in providing the emergency credit here described. The innovation has potentialities only faintly indicated by the extent to which the fund available for capitalizing agricultural-credit corporations has been utilized up to the present. So far less use has been made of the new facilities than was originally expected. Many interested groups had not enough time to obtain subscriptions for stock and to organize operating corporations so as to take care of 1931 crop requirements. Emergency-credit requirements of farmers in the drought area were largely taken care of in other ways, principally through advances from the $45,000,000 appropriation for loans to purchase seed, feed, and fertilizer. Additional financing through credit corporations was consequently less urgent. Nevertheless much valuable preliminary work was done. The National Advisory Loan Committee devoted much effort to an educational campaign in which radio broadcasting, press releases, and other means were used to acquaint farmers with the advantages of organizing local agricultural-credit corporations. Farmers thus became better acquainted with what they can do for themselves by organizing to rediscount their paper through the intermediate credit banks.

The rapid readjustment which has been forced upon agriculture as a result of the marked decline in farm-commodity prices since 1920 has likewise caused material changes in the usual supply of credit available to farmers. Every effort, therefore, should be devoted to strengthening existing credit agencies, and whenever possible, consideration should be given to such measures as would tend to increase their usefulness.

DROUGHT RELIEF

Excluding the $10,000,000 set aside to organize new or to strengthen existing agricultural-credit corporations, the department, as already indicated, had $57,000,000 available for drought relief. More than 385,000 applicants borrowed approximately $47,000,000 to purchase seed, fertilizer, feed for livestock, and fuel and oil for power machinery, and for agricultural rehabilitation.

Widespread need resulted from the severe drought that prevailed during the 1930 crop-growing season. The worst effects were concen-

trated in a triangular section of the Potomac, Ohio, and Mississippi Valleys running from southern Pennsylvania, Maryland, and Virginia to southern Kansas, to Alabama, and to Texas. Neighboring States felt the drought more or less. How its effects were geographically distributed is indicated by the composite yield per acre of all crops in 17 States principally affected. This composite yield is expressed as a percentage of the average for the 10-year period 1919–1928. It was 87 in Pennsylvania, 73.4 in Maryland, 67.7 in Virginia, 56.9 in West Virginia, 79.3 in Ohio, 84.4 in Indiana, 83.1 in Illinois, 60.5 in Kentucky, 75.6 in Tennessee, 66.8 in Missouri, 62.8 in Arkansas, 89.8 in Kansas, 71.2 in Oklahoma, 86 in Texas, 91.5 in Mississippi, 100.3 in Louisiana, and 111.3 in Alabama. Yields above the 10-year average in Louisiana and Alabama are explained by the fact that only certain sections in those States were drought stricken, and that cotton, their principal crop, withstood the drought surprisingly.

In most of the drought-stricken States gross income from farm production was much below the average for the 5-year period 1924–1928. It ranged from 4 per cent below that average in Pennsylvania to 46 per cent below it in Arkansas and in Oklahoma. In Mississippi the gross income was 39 per cent below the 5-year average, in Texas 37 per cent below, and in Alabama 29 per cent below. Feed production was most affected, wheat and rye and many of the vegetable crops having been harvested before the drought became severe. Rice was not much hurt, since it is grown under irrigation. Pastures were extremely scant. In fact, for the entire 1930 pasture season the condition of pastures in the drought States was only from 50 to 80 per cent of the 10-year (1920–1929) average. Short supplies of grain and hay and poor pastures reduced the output of animal products materially. In the 17 States mentioned, milk production per cow on August 1, when the drought was at its height, was 11.3 per cent below the output on August 1, 1929. Egg production per hen was 9.5 per cent lower. Nevertheless, the production of milk and eggs in these States for the full year 1930, with some exceptions in South Central States, was above the average of the 5-year period 1924–1928, both in total volume and in output per cow and per hen. A mild autumn and winter enabled farmers to economize their livestock feeds, and the drought did not seriously affect the meat supply of 1930. In some areas it temporarily increased market supplies through forced marketing. Beef production in the 17 States was slightly greater than in the previous year; and sheep and lamb production was greater also. The production of calves and hogs declined, but not as a result of the drought.

Much Privation Caused

Statistics, however, give a poor impression of the human side of the drought situation. Tens of thousands of farm families had their savings swept away, and even their subsistence endangered. Usually when weather conditions reduce production prices rise. No such partial compensation came to the drought-stricken areas in 1930 because demand and prices declined under the impact of the world depression. For the little they had to sell farm families got extremely low unit prices. Feeds had to be moved into deficit areas, and in many localities it was necessary also to supply food. Aid was rushed by the Red Cross and by State and local agencies. It was supplemented by Fed-

eral action when Congress, on December 20, 1930, passed the first drought-relief resolution and charged this department with the administration of the funds provided.

Field offices for the handling of applications for loans were established in Washington, D. C.; Memphis, Tenn.; Fort Worth, Tex.; St. Louis, Mo.; and Grand Forks, N. Dak. The making of loans began about February 1, and continued at a rapid rate through the late winter and early spring months. Several hundred temporary workers were employed in these field offices in handling the applications for loans, and valuable assistance was given in the examination of applications by a large number of district agents and specialists from the State extension forces. Loans were made in 1,646 counties in 31 States.

In each county a local seed-loan committee was set up, usually consisting of a prominent banker or other business man and two leading farmers. These committees examined all applications for loans originating in their counties and made recommendations thereon to the department field offices. On approval of the applications for loans at the field office, payment was made to the borrower by check, the transaction in a large proportion of cases being completed in less than a week from the time application was made. As borrowers did not need all their funds immediately on the approval of their applications, payments in many cases were made in two or more installments, as funds were required. These installments were paid only after the receipt of a report from the borrower as to the purposes for which the initial advance had been expended.

All applicants for loans were required to agree to plant a garden, and also a sufficient acreage of feed crops to provide feed for their livestock. This policy was in line with that generally advocated by the agricultural colleges and extension forces in the Southern States, and followed also by many agencies that assist in financing farmers.

Loans from the Various Appropriations

Out of the $45,000,000 appropriation, 279,466 loans were made aggregating $39,716,797. Out of the $20,000,000 appropriation, 91,075 loans for agricultural rehabilitation were made aggregating $5,430,783. Out of the $2,000,000 appropriation, 14,651 loans were made, aggregating $1,908,181. All told, 385,192 applications were approved for loans aggregating $47,055,761.

As loans were made from the rehabilitation fund to many farmers who had already borrowed from the $45,000,000 appropriation, the number of individuals to whom loans were made is somewhat less than the total shown. On the other hand, many loans were made to landlords, each of whom financed several farm families, so that the total number of farm families financed was probably between 350,000 and 400,000. The average loan was slightly less than $150, and in certain States, such as Oklahoma and Kentucky, the average was less than $100. The small size of these loans shows clearly that farmers generally economized on production expenses and conducted their farming operations in 1931 at the lowest possible cost.

Federal and State extension forces helped farmers, not only in using wisely the money advanced to them, but in utilizing other resources. Farm men and women were urged to plant fall gardens of rapidly maturing vegetables. They were shown how to preserve poultry, beef, vegetables, and eggs. They were advised about cheap, wholesome

foods. As a result the food problem was made less difficult. Meat canning relieved many farmers of the necessity of purchasing feed for their animals, or of selling them at low prices, and at the same time provided a meat supply. Farm women were taught how to renovate and remodel old garments. Practical help was given also in the choice and use of emergency rations for livestock. Farmers were assisted in culling their herds and flocks and encouraged to plant forage crops for fall and spring pasture.

Feed and Forage Supplies Located

Extension agents located supplies of feed and forage, and worked out plans for distributing feedstuffs at the lowest possible cost. County agents helped farmers to get the benefit of reduced freight rates granted by railroads on the movement of hay, feed, and water into drought areas, and on the outward movement of livestock. They and other representatives of Federal and State agencies promoted crop adjustments suited to market needs. In the wheat States they urged the elimination of wheat as a major source of income on farms of poor soil or difficult topography. In the cotton States they emphasized the necessity of a balanced system of agriculture with feed and food crops holding an adequate place in the crop organization.

TABLE 1.—*Loans made to individual farmers in each of the States most seriously affected by drought*

State	From $45,000,000 appropriation		From $20,000,000 appropriation		From $2,000,000 appropriation		Total	
	Number	*Dollars*	*Number*	*Dollars*	*Number*	*Dollars*	*Number*	*Dollars*
Alabama	14, 406	2, 211, 480	3, 812	193, 649	1, 535	267, 438	19, 753	2, 672, 567
Arkansas	51, 831	7, 606, 443	26, 675	1, 604, 661			78, 506	9, 211, 104
Georgia	13, 231	1, 976, 690	321	14, 503	4, 126	545, 877	17, 678	2, 537, 070
Indiana	5, 650	777, 542	388	25, 388			6, 038	802, 930
Kentucky	25, 129	2, 247, 645	8, 108	340, 431			33, 237	2, 588, 076
Louisiana	15, 392	2, 497, 342	10, 205	693, 093			25, 597	3, 190, 435
Mississippi	21, 738	3, 697, 495	9, 868	741, 879			31, 606	4, 439, 374
Missouri	15, 029	2, 031, 140	3, 087	271, 642			18, 116	2, 302, 782
Montana	8, 027	2, 071, 210	92	10, 030			8, 119	2, 081, 240
North Carolina	12, 927	1, 903, 235	3, 436	153, 855	970	153, 912	17, 333	2, 211, 002
North Dakota	8, 304	1, 597, 587					8, 304	1, 597, 587
Oklahoma	14, 770	1, 397, 372	4, 099	224, 517			18, 869	1, 621, 889
South Carolina	536	89, 139			7, 620	895, 009	8, 156	984, 148
Tennessee	16, 673	1, 866, 903	7, 394	439, 669			24, 067	2, 306, 572
Texas	20, 379	2, 582, 558	9, 178	502, 927			29, 557	3, 085, 485
Virginia	16, 467	2, 179, 033	3, 563	175, 134			20, 030	2, 354, 167
West Virginia	5, 551	522, 480	495	18, 098			6, 046	540, 578
Total	266, 040	37, 255, 294	90, 721	5, 409, 476	14, 251	1, 862, 236	371, 012	44, 527, 006
All other States	13, 426	2, 461, 503	354	21, 307	400	45, 945	14, 180	2, 528, 755
Grand total	279, 466	39, 716, 797	91, 075	5, 430, 783	14, 651	1, 908, 181	385, 192	47, 055, 761

UNEMPLOYMENT RELIEF

Congress also appropriated large sums to the Department of Agriculture for types of work that contributed to unemployment relief. In most cases the funds appropriated were additions to moneys that would ordinarily have been provided for department activities. In some cases, however, department activities were anticipated by making funds, which ordinarily would not have been available until after July 1, 1931, available during the winter and spring months, for the relief of unemployment. Increased funds were provided for the con-

struction of Federal-aid highways, for roads and trails in the national forests, and for roads traversing the public domain. Various sums were made available to give employment in the repair, construction, and improvement of laboratory buildings, farm facilities, forest-protection facilities, and other equipment used in the department's research and service work. Altogether more than $100,000,000 was appropriated for objects related to unemployment relief. Emergency employment was directly provided for varying periods for nearly 200,000 men, and indirectly for a much larger number in industries supplying necessary materials and services. Where possible in employing men the department gave preference to the heads of families.

Federal-aid road construction was accelerated as early as April, 1930, when Congress authorized for this purpose an additional $50,000,000, bringing the total Federal contribution for Federal-aid roads to $125,000,000 effective with the fiscal year 1932. The actual amount expended in the fiscal year 1931 from the regular Federal-aid highway appropriations was approximately $135,600,000, including some $26,000,000 from the $125,000,000 appropriation for 1932, which was made immediately available. This fund provided work for farmers distressed by the 1930 drought, as well as for unemployed urban workmen. A full discussion of unemployment aid resulting from the enlarged program of the Bureau of Public Roads is given in the next section of this report.

Work in National Forests

Road work in the national forests provided considerable employment. Forest improvement already under way was speeded up, and $3,000,000 was added to the regular fund for the construction of forest roads and trails. This work created a need for more equipment, such as tractors, graders, power shuttles, compressors, rock crushers, and trucks. In the first half of the current year the department purchased $145,000 worth of such equipment. Where unemployment was extreme the department rotated available men in construction crews. For the fiscal year 1932, $800,000 was made available to build a forest products laboratory at Madison, Wis., and $150,000 for white-pine blister rust control in addition to the usual appropriation for that purpose.

Various measures to relieve unemployment were adopted by the Forest Service. In Arkansas, for example, many farmers living in or near a national forest faced destitution. In this area several hundred men were enabled to support their families by cutting and selling stave bolts. Other men were employed in making silvicultural cuttings to improve the timber growth. For this purpose one forest supervisor disbursed $12,000 in wages during a 4-month period, giving work to those who needed it most. Construction plans were modified where possible to permit forest road building during the winter. In some places construction crews were alternated. When emergency funds became available for forest improvements action was started in all the national forests and plans made looking toward the progressive equipment of the forests with roads, trails, lookout houses and towers, telephone lines, firebreaks, cabins, barns, inclosed pastures, and drift fences. Comprehensive plans for carrying on such work make it possible to forward it as circumstances warrant. Decentralized organization gives the Forest Service machinery for getting new work under

way rapidly under the supervision of trained local men. As soon as plans for the use of the $3,000,000 emergency appropriation were completed, allotments to each region were telegraphed to regional foresters and to forest supervisors. Awards for the purchase of equipment followed and in some cases equipment was on the ground within 10 days. By the end of January, 1931, 3,083 men had been given employment under the appropriation; by the end of May the number had increased to 4,558.

Additional funds for emergency improvement by the Forest Service became available under an act approved February 6, 1931, which set aside $354,800 for insect-control work, forest administration, and range improvements on the national forests. In the regular agricultural appropriation act of February 23, 1931, a provision was included making available immediately certain 1932 appropriations, mainly for forest protection. In June, 1931, the total number of men employed in this work, including those who were given temporary employment through the use of regular 1931 appropriations, was 21,658. By the end of the fiscal year, practically all the emergency funds had been expended or obligated, and about half of the 1932 appropriations made available for use in 1931 had been expended.

Other Emergency Appropriations

The emergency appropriations also included $300,000 to the Bureau of Biological Survey for the fiscal year ended June 30, 1931, for building dams, fences, telephone lines, electric, water, and septic-tank systems, and cold-storage plants; for surveys of wild-life refuges; and for the control of injurious rodents and predatory animals. About two-thirds of the expenditures made from this appropriation were for personal services. An emergency fund of $75,000 was provided for the construction and improvement of farm and laboratory buildings required by the Bureau of Plant Industry, and for necessary installations in connection with the field activities of that bureau. An appropriation of $35,000 was made for construction, by the Plant Quarantine and Control Administration, of a car-fumigation plant at Presidio, Tex. A $58,000 emergency fund was made available to the Bureau of Animal Industry for construction and development work at its farms at Beltsville, Md., and Miles City, Mont. Employment was furnished by the bureau to many men in clearing land, establishing pastures, building fences, and in constructing laboratories and other buildings. A total of $87,000 was made available to the Bureau of Dairy Industry for the construction of buildings and other improvements at dairy experiment stations at Beltsville, Md., Woodward, Okla., and Ardmore, S. Dak. Appropriations aggregating $83,480 were also provided for improvements to the department's buildings in Washington, D. C., including the modernization of its elevator and electrical systems, resulting in additional employment opportunities.

Other bureaus in the department helped to relieve unemployment or to mitigate its effects. The Bureau of Home Economics, for example, prepared economical and healthful food budgets, and carried on necessary educational work, in cooperation with the Extension Service. They cooperated with the American Red Cross in ascertaining the types of help needed and the resources available. More than 750,000 bulletins and posters were distributed in drought and unemployment relief work.

PUBLIC ROADS

Between January and September there were employed on Federal-aid road construction and road construction in the national forests and parks an average of 100,000 men. During this period these men worked the equivalent of 150 days at an average wage of $4 per day. On this road work, in which the Federal Government participated either as a cooperator with the States or independently, there was paid to labor employed directly on the roads approximately $60,000,000.

Actually the number of men employed varied during the period from a minimum of 31,000 in January to a maximum of 164,700 in July. By April there were 97,500 at work, and during the active construction season from May to August, inclusive, the number averaged nearly 150,000.

These figures represent the employment offered directly in the construction of the roads. For every person employed directly there are probably at least two indirectly employed in the production and transportation of road materials and equipment. If that be the case, the road-building work in which the department participated occupied an average of approximately 450,000 men during the active season, and the equivalent of 300,000 men for the period from January 1 to September 1, 1931.

The increase in employment offered on Federal and Federal-aid road work this year is indicated by comparison of the 154,450 persons reported as employed directly during June, 1931, with the 64,000 employed during the same month of 1930.

The increased employment afforded by the road work during the fiscal year 1931 is the result of the increased appropriations authorized, the early apportionment of the Federal-aid authorization, and the emergency legislation of December 20, 1930, especially the $80,000,000 appropriated as an advance to the States to be used by them in lieu of State funds in order to get work under way early in the calendar year 1931. This appropriation is not an outright grant, but merely a loan which the States are to repay over a period of five years by deduction from their future apportionments of regular Federal-aid funds beginning in the fiscal year 1933.

Cooperative Projects Give Greatest Aid

Although the independent Federal construction on national-forest and national-park roads was increased, the Federal-aid road work in which the cost was shared with the States provided by far the greatest amount of employment, and the increase in volume of this work during the fiscal year is the result of three separate actions

Increased Appropriations

First was the authorization of an additional appropriation of $50,000,000 for the fiscal year 1931. This addition, bringing the total authorized for the current fiscal year to $125,000,000, was approved April 4, 1930, and immediately apportioned. It had the prompt effect of increasing the work undertaken during the summer of 1930.

On September 1, 1930, the appropriation of $125,000,000 authorized for the fiscal year 1932 was apportioned. Normally the apportion-

ment would not have been made until the latter part of December. The advancement of the date added to the amount of work undertaken during the autumn and carried over as the bulk of the work current during the early months of 1931.

Stimulated by the enlarged Federal-aid apportionment, the volume of construction work carried on and completed during 1930 was further increased by the exceptionally long, dry working season. This resulted in an abnormally large expenditure, and left many States with seriously depleted revenues which could not be renewed except by action of the State legislatures. As in many cases the sessions of the legislatures were not convened until after January 1, it seemed probable in December that unless some further action was taken by the Federal Government the resumption of construction work in the spring would be delayed because of a lack of State funds with which to match the available Federal apportionments.

Congress Authorizes Advance in Program

To avoid this possibility Congress, on December 20, appropriated $80,000,000 to be apportioned among the States in the same manner as the regular Federal-aid authorizations and used by them to match the Federal-aid funds. As it was the purpose to encourage the beginning of work as promptly as possible in order to provide early relief to the unemployed, the amount of the apportioned funds which the States could claim was limited to the amount that should be actually expended by September 1.

This method of stimulating and advancing the construction program proved effective. Within a month $15,000,000 of the emergency fund and $14,500,000 of regular Federal aid had been allotted to new projects. The Federal-aid roads under construction, aggregating a little over 8,800 miles at the end of January, increased to nearly 10,400 miles by the end of March. This was virtually as much as the mileage under construction by the end of July of the preceding year; and by June 30, the end of the fiscal year, construction work was in progress on nearly 16,500 miles.

Nearly $75,000,000 of the $80,000,000 emergency appropriation had been allotted to projects by May 31; and by August 31, the limiting date set by Congress, virtually the whole amount appropriated had been earned by completion of work. Until the last vouchers are received from the States the exact amount earned can not be ascertained

Road-Construction Progress

During the fiscal year 1931 Federal-aid projects involving the improvement of 11,033 miles of road were completed. Of this mileage, 7,939 miles were initially improved; that is, the improvements completed were the first to be made with Federal aid on the particular roads involved. Advanced stages of construction, adding a further degree of betterment to roads previously improved to some extent with Federal aid, were completed on 3,082 miles; and 12 miles built a number of years ago with Federal assistance were reconstructed.

The total mileage improved with Federal aid to date and classified as completed, excluding 4,174 miles which was undergoing stage construction or reconstruction at the end of the fiscal year, is 88,713 miles.

Of this completed mileage, nearly 390 miles consisted of bridges over 20 feet in span and their immediate approaches. The remainder of 88,323 miles was made up of roads variously constructed according to the requirements of traffic and the means available in each particular case. Roads totaling 36,626 miles were improved with high-type surfaces of bituminous macadam, bituminous concrete, Portland-cement concrete, and vitrified brick and other block pavements. These are types of improvement suitable for the most heavily traveled roads.

Roads of intermediate traffic density, totaling 4,529 miles, were improved with macadam, various low-cost bituminous mixtures, and bituminous-treated gravel surfaces. On 35,920 miles of less heavily traveled roads, surfaces of gravel without bituminous treatment and sand-clay and topsoil surfaces were laid, and 11,248 miles were improved merely by grading and draining. All of the last class of improvements are approved upon the definite understanding that surfaces adequate to meet traffic requirements will be laid as promptly as possible. The roads thus improved and those on which low-type surfaces have been built are the sections of the system upon which subsequent stage-construction operations will be conducted.

Work in Progress at End of Fiscal Year

At the close of the fiscal year work was in progress on 16,481 miles of road. On 12,306 miles the work under way was the first work to be done with Federal aid; on 4,139 miles the work consisted of an advanced stage of construction added to an improvement previously made with Federal aid; and on 36 miles the work was reconstruction.

The 11,033 miles completed during the fiscal year were built at a total cost of $255,088,414.09, toward which the Federal Government contributed $105,918,451.14 and the States the balance. Not all of the Federal contribution to these roads was paid during the past year. Payments were made for work done upon them throughout practically the entire period of their construction, which on many projects considerably exceeded a year.

But the payments actually made to the States during the year on these completed projects and others still under construction exceeded the amount involved in the completed projects and reached the total of $133,340,910.64. This is the largest sum of Federal-aid money ever paid to the States in a single year. It exceeds by nearly $12,000,000 the recently increased apportionment of $121,875,000.

This heavy disbursement, made possible by the existence of a relatively small unexpended balance from previous fiscal years, is another indication of the extent to which the Federal-aid program has been enlarged in the effort to furnish additional employment. So high a rate of expenditure can not be long continued, however, because the expenditures must be kept within the amount apportioned when all accumulated balances have been exhausted.

Forest Highways

In the national forests improvements were completed on 281 miles of the forest-highway system, bringing the total improved to date to 4,638 miles. The forest highways are the most heavily traveled of the roads traversing the forest areas. They comprise a system, which has been designated in cooperation with State highway officials, aggregating

15,024 miles. Of this mileage, 8,787 miles consist of roads which are necessary sections or extensions of the Federal-aid system, and 6,237 miles serve communities within the forests.

For this work also the appropriation authorized for the fiscal year 1931 was increased. For all road work in the forests in 1930 the authorization was $7,500,000. Of this sum, $3,000,000 was reserved for the improvement of roads and trails needed for the administration and protection of the forests themselves, and the balance of $4,500,000 was available for the roads more extensively used by the public. For 1931 the whole authorization was increased to $12,500,000 and the amount for forest highways to $9,500,000, the sum reserved for trails remaining $3,000,000. The act of December 20, 1930, also carried an appropriation of $3,000,000 to further increase employment on forest-highway work.

As a result of these increased appropriations the forest-highway construction program has been rapidly expanded. The entire amount of the emergency appropriation was obligated by June 30, and there was placed under construction a mileage of projects to be financed with the other available funds exceeding the corresponding mileage in the preceding year by 75 per cent.

The difficulties of location and construction and the short working season entailed by the altitude and isolation of many of the forests have prevented as rapid an expansion of the construction program as was possible in the case of Federal-aid roads; but considering these circumstances, the progress made in this work is very substantial.

NEW CONTACTS WITH FRUIT AND VEGETABLE INDUSTRIES

The passage of the perishable agricultural commodities act, signed June 10, 1930, opened to the department a new field of usefulness to the growers and handlers of fresh fruits and vegetables. This act is designed to suppress unfair and fraudulent practices, to prohibit fraudulent charges, unjustifiable rejections or failures to deliver, and to prevent the discarding or dumping of consigned products without reasonable cause. As a means to this end, handlers of fresh fruits and vegetables moving in interstate or foreign commerce in carload quantities were required to obtain licenses from this department. Violations of the act may be punished by the suspension or revocation of licenses or by publication of the facts. Redress for parties injured by violations of the act may be secured through reparation orders issued by this department after the determination of the facts by investigation and public hearing.

By the close of the fiscal year, 15,180 licenses had been issued. Approximately 1,500 requests were received for the investigation of disputes. Of these, more than 800 were satisfactorily closed. Action by the department's solicitor was invoked in 102 cases; the remainder are pending. Under an earlier enactment, the produce agency act, 296 complaints were received and 217 closed. Thirteen cases went to trial in the United States courts, all of which resulted in convictions.

In the informal handling of many hundreds of cases the department has been able to strengthen the position of that large element in the fruit and vegetable trade which has been striving for many years to improve the business ethics of the industry.

AGRICULTURAL ENGINEERING

Full realization of the possibilities of machinery in agriculture calls for the removal of impediments to machine operation, and in fact for all such modifications of the physical aspects of farms as are necessary to promote economical and scientific management. This is a problem in agricultural engineering. It is being studied, with related problems, by the Bureau of Agricultural Engineering. This bureau, authorized by the last Congress, began its existence on July 1, 1931. It is new, however, only in being a separate bureau. Agricultural engineering work in the department goes back to 1898, when Congress first appropriated money for "irrigation information." Provision was later made for the study of drainage problems. In 1915 the scope of agricultural-engineering research in the department was widened to include a study of farm machinery and farm buildings. Originally the work was divided among different bureaus. In 1925 it was consolidated in the Division of Agricultural Engineering in the Bureau of Public Roads, and reached proportions that suggested the advisability of intrusting it to a distinct bureau.

Sound engineering is indispensable to the economical use of land. This is as true for the small farm as for the large. In fact, the immediate task of the Bureau of Agricultural Engineering is to promote the welfare of our six and a quarter million small-farm operators. It will strive specially to serve the needs of the family farm, particularly in such matters as the construction of farm buildings, the proper choice of farm machinery, the improvement of farm water supplies and farm sanitation, the control of insects and plant diseases by mechanical means, the preservation of farm products by refrigeration, and the prevention of soil erosion. Three problems are outstanding in connection with farm buildings—the need of remodeling farm homes; the improvement of livestock barns, particularly dairy barns; and the provision of more and better farm storage. In connection with farm machinery, considerable work to supplement progress already made is necessary in the mechanical control of the European corn borer and in the more efficient mechanical distribution of fertilizers. Studies in irrigation will be broadened. In irrigation studies the big problem is the conservation of water, rather than the irrigation of additional land. Agricultural engineering may help to prevent soil erosion by developing better terracing methods, and also by indicating desirable changes in machinery designed for use on terraced fields. Improved engineering practices can materially reduce farm costs of production.

ANIMAL-INDUSTRY INVESTIGATIONS

The livestock industry continues to be a valuable balance wheel to agriculture, especially in utilizing crops produced in excess of human requirements. Though low prices have prevailed for food animals this year, stock raising is essentially in a sound and stable condition. Losses from diseases, parasites, and other causes are being steadily reduced, and research dealing with the economy of production is giving new information of public interest and practical value.

Beef-cattle range studies, conducted during the year in cooperation with State experiment stations, showed that materially larger calf crop are obtained from pasture breeding than when the cows are bred on

open range or forest reserves. The number of calves alive at weaning time was from 7 to 11 per cent greater in the case of the pasture-bred lots.

Attention was given to beef-cattle production and meat utilization in southern areas recently released from the cattle-tick quarantine. As a result, increased numbers of cattle were fattened on grain, and the production of higher quality meat rose in many localities. The work resulted in a greater production of feed crops suitable for beef production. Also the number of purebred beef bulls used in the area increased.

Experiments in lamb production again demonstrated the advantage of giving ewes extra feed at breeding time, a practice known as flushing. For this purpose good pasture proved superior to all other feeds. Ewes flushed on extra-good pasture produced 164 lambs per hundred ewes. Those fed grain produced 152 lambs per hundred ewes. Those not given any extra feed at breeding time produced only 143 lambs per hundred ewes.

It has long been customary to feed market hogs all they will eat, to bring them to desired market weights as quickly as possible. In recent investigations, however, limited feeding resulted in more economical pork production. Hogs fed a limited ration made less rapid gains, and required longer feeding periods. But they were more efficient in utilizing their ration and required much less feed per hundred pounds of gain than did those fed a full ration. Moreover, limited feeding produced somewhat leaner carcasses, an advantage since the taste of the American consumer is gradually turning toward leaner pork. These results offer the producer additional means of reducing pork-production costs when market conditions are favorable to a longer feeding period.

Swine-breeding investigations showed, contrary to the general opinion, that crossbreds are not always superior to purebreds in vigor and gains. It was found also that fertility and low mortality were more important factors in economical swine production than minor differences in type and rate of gain.

Meat investigations, conducted by 3 department bureaus cooperatively with 22 experiment stations, continued to throw new light on the factors which make meat tender, palatable, and otherwise desirable from the consumers' standpoint. These results suggested carefully planned performance studies, which were begun during the year, to identify and improve superior strains of meat animals within a breed. Consideration is being given not only to production efficiency, but to carcass yields and quality of meat produced.

Much attention was given to means of increasing the hatchability of hens' eggs. The results obtained were superior to those of previous years, in part because the breeding stock had been selected on the basis of hatchability. A study of the effect of egg production on hatchability showed that a large production of eggs during the breeding season is apparently conducive to good hatchability.

Bovine-Tuberculosis Eradication

The extensive Federal-State task of eradicating tuberculosis from livestock is steadily progressing. The degree of infection among cattle was more than 4 per cent at the beginning of the campaign 13 years ago. The corresponding figure for 1931 was only 1.5 per cent. More than 13,000,000 cattle were tested during the last fiscal year, out of

which number 203,778 proved to be tuberculous as indicated by their reaction to the tuberculin test. The elimination of these animals removed a menace to the public and to the livestock industry.

The method of area testing by which all the cattle in a given unit, generally a county, are tested within a short time again proved effective and economical. At the end of the fiscal year 1,223 counties (and 50 towns in Vermont) had completed one or more tests of all cattle within their borders, and had been officially designated as modified accredited areas. This term signified that bovine tuberculosis has been reduced to one-half of 1 per cent or less and that all reacting cattle have been removed. Four entire States—North Carolina, Maine, Michigan, and Indiana—have been freed of bovine tuberculosis by the area method.

Records of Federal meat inspection indicated further reduction in the number of cattle and hogs condemned as unfit for food because of tuberculosis. This reduction reflected important savings to livestock producers through reduced infection on farms. The benefit will continue, provided owners cooperate with livestock sanitary authorities in preventing reinfection.

The present time is opportune for tuberculosis-eradication work even in highly infected areas. Dairy cattle can be obtained at moderate cost for replacement purposes. Hence the removal of reactors from herds is cheaper than during times of higher prices for cattle and cattle products. Moreover, the indemnity paid and the salvage value received reduce the loss to a low figure in proportion to the benefits of having healthy herds. The average combined Federal and State indemnity paid last year was approximately $65. In addition owners received a salvage value of about $25 for the average reactor.

The demand for tuberculin testing in most States continued to exceed the facilities for meeting it, and waiting lists were necessary. Sporadic opposition decreased, largely because of a better understanding of the benefits of eradicating bovine tuberculosis. Court decisions favored the continuance of testing where the authority to do the work or the accuracy of the tests had been questioned.

Tuberculosis of Poultry and Swine

The elimination of tuberculosis from poultry and swine also received added attention, and plans were made for active eradication work in the more seriously infected areas. Farmers in some States have received 2 cents a pound less for their poultry because of the presence of the disease in a large number of fowls marketed. Such losses stimulate interest in the eradication work. Hogs are commonly slaughtered so young that tuberculous lesions are rarely extensive. There is nevertheless a heavy loss owing to the condemnation of hog carcasses and parts, and to the special handling that infected hog carcasses must receive in federally inspected slaughtering establishments. Hogs contract tuberculosis from both cattle and poultry. Hence the suppression of the disease in cattle and poultry is essential to its elimination from hogs. Meanwhile, losses can be reduced by methods of feeding and management that protect cattle, hogs, and poultry from sources of infection. The continued cooperation of livestock owners and the public is earnestly being sought to the end that progress in eradicating this disease may be still further hastened.

Animal Parasites Yield to Science

Of 15 Southern States formerly infected with the cattle-fever tick, only 4—Arkansas, Florida, Louisiana, and Texas—still have quarantined areas. Instead of constituting one solid block, as formerly, the tick-infested region has now been split up into three separate parts bounded by free areas in which sentiment is favorable for an early completion of the entire eradication program.

The department is combating other parasites that hamper stock raising. On the Pacific coast liver-fluke control work, begun on a small scale three years ago, has been extended in California and introduced into sections of Oregon, Nevada, and Arizona. Before the work began ranchers in California suffered severe losses, and sheep raising practically ceased in several areas. Demonstrations by department workers encouraged stock owners to use the system advised for controlling liver-fluke disease, which consists in the destruction of snails on pastures by the application of copper sulphate, and the medicinal treatment of affected animals. Losses were rapidly checked. Where the recommendations were strictly followed, the disease disappeared. Sheep raising was made a dependable enterprise, and sheep a stable security for bank loans. Liver-fluke control has resulted also in material savings in feed and in a more economical production of lambs.

In the Middle West the department's system of preventing the infestation of hogs with roundworms and other parasites has been widely used. Reports show that success in producing hogs varies almost directly with the degree of attention given to sanitation. The cost of swine production was reduced in some instances by approximately one-third.

The program of combating parasitic diseases in livestock and poultry is directed largely along two lines: Research on the life cycles of parasites as a basis for control and preventive measures, and the investigations of remedies. These investigations have revealed essential facts concerning numerous other important parasites, such as kidney worms, nodular worms, and lungworms of swine, and various species of roundworms and tapeworms of poultry. Practically all the remedies used for combating the external and internal parasites of livestock in the United States and abroad have been either discovered or standardized by investigators in this department.

Livestock Regulatory Work Constructive

Though certain forms of Federal regulation are accepted by producers and the public as a necessary protection, a better understanding of this branch of the department's work is highly desirable. Greater knowledge of it should help to prevent both inadvertent and wilful violations. Compliance, in turn, increases the effectiveness of the work which has proved to be highly constructive in its effect on the industry.

In administering the packers and stockyards act, the Secretary of Agriculture has supervision over various practices and conditions, including commission rates and yardage charges. When investigation indicates such marketing costs to be unreasonable, he may order changes. Recent department orders, affecting yardage charges at two markets and commission rates at a third, are estimated to save shippers approximately $345,000 a year. The settlement of disputes and complaints regarding the quality and weight of feed, alleged shortages, and

the "switching" of animals receive attention. The testing and maintenance of scales for weighing livestock at designated markets are under supervision, and many improvements in the installation of scales have been made. At the close of the year 91 stockyards were "posted" as coming within the jurisdiction of the packers and stockyards act.

Federal meat inspection has increased public confidence in the wholesomeness of meats bearing the Federal stamp of approval. This hygienic service covers the slaughter, and conversion into meat, of about 74,000,000 animals annually. It also helps in the development of a foreign market which, in the absence of inspection, would be largely closed to meat from the United States. During the last fiscal year, 66,436 official meat-inspection certificates were issued, to cover the exportation of more than 900,000,000 pounds of meat and meat-food products. Approximately 33,000,000 pounds of meat and meat-food products offered for importation from foreign countries was inspected. Approximately 300,000 pounds, principally beef, was condemned or refused entry.

Establishments that produce vaccines, serums, and other veterinary products are licensed and inspected. The use of such products, among which anti-hog-cholera serum is the most familiar, enables stockmen to raise a greater proportion of their animals to maturity or market size. The production of clear anti-hog-cholera serum last year increased 19 per cent over that of the preceding year, the total production of all anti-hog-cholera serum increasing less than 5 per cent.

Livestock are admitted into the United States only from countries free from important livestock maladies, and then only in accordance with a system of certificates, inspection, and other means of control. Similar restrictions apply to many products such as hay, other feeding materials, hides, skins, and other articles associated with livestock. Animals shipped in interstate commerce are likewise subject to inspection, dipping, immunizing treatment, and similar safeguards. The results of the year's work show the far-reaching scope of this protection. No serious foreign livestock diseases gained entrance to the United States, though more than 116,000 animals and vast quantities of products associated with livestock were imported. Several hundred animals were refused entry because of diseased or parasitic condition.

Supervision over the movement of livestock in interstate commerce included about 75,000,000 cattle, sheep, and swine of which more than a million were dipped, immunized, or otherwise treated to prevent the spread of disease in areas to which the stock were shipped. More than 22,000 stock cars were cleaned and disinfected under Federal supervision. Similar treatment was given to about 13,500 cars used in the transportation of live poultry.

DAIRY RESEARCH AND SERVICE

Results of 13 years of dairy-cattle breeding research and experimental work enable the department to declare that the most certain way to develop herds with an inheritance for uniformly high production is through the continuous use of "proved sires." A meritorious proved sire is one that has demonstrated through the production records of his daughters that he transmits only a high level of production. Since a bull can not be proved without an adequate number of records of his daughters, every efforti s being made to increase facilities for obtaining

and compiling such records. One of the most practical ways is through dairy-herd improvement associations. With the records obtained through these associations, good bulls can be located.

Progressive breeders, agricultural colleges, and experiment stations are proving out a few bulls each year, through the records of their own herds or by lending promising young bulls to cooperators. The Bureau of Dairy Industry compiled this year enough production records on the daughters of bulls it had placed from its experimental herds with cooperators to afford evidence of the transmitting ability of seven Holstein sires. The daughters of six of these sires produced more milk and butterfat than their dams. The increases in milk production ranged from 208 to 2,120 pounds a year, and in butterfat production from 29 to 89 pounds a year. Only one of the seven had daughters which produced less than their dams. Records of eight Jersey sires showed that the daughters of seven of them averaged from 6 to 109 pounds more butterfat production than the dams of the daughters. On the other hand, the daughters of one sire had on an average a yearly production of 21 pounds of butterfat less than their dams. Results of the proved-sire method in herds at various field stations promise success from the application of this principle of breeding, whether the system used be outbreeding, line-breeding, or inbreeding.

Methods of Manufacturing By-Products

The department further developed improved methods of manufacturing cheese, ice cream, casein, and other by-products of the dairy industry and induced many commercial plants to adopt these methods. Half of the 36,000,000 pounds of Swiss cheese consumed annually in the United States is imported. Much of the domestic market is lost to our own dairy industry because American Swiss cheese is frequently not equal in quality to the imported article. It was demonstrated some years ago that the quality of Swiss cheese depends largely on the quality of the milk used in making it, and on the control of bacterial development in the cheese during its manufacture and ripening. The "culture method" of making Swiss cheese, which was developed by the department, enabled factories to produce a higher percentage of high-quality cheese.

Recent improvements in this method promise still better results. The earlier work demonstrated that there are at least two kinds of bacteria essential to proper ripening of this type of cheese and that the quality can usually be improved by adding them to the milk in pure cultures. It was afterward found that a third starter organism is also necessary. Later investigations indicated that the most advantageous rate of growth of these bacteria, their proper numerical relation at the different stages of manufacture and ripening, and the effect of one group on another.

It was found, for example, that certain bacteria are essential to proper eye and flavor development, but that too many cause "oversetting." The rate of growth of this culture was determined under different temperature conditions, and methods of starter making were standardized to introduce a uniform number of eye-forming bacteria into each cheese.

In the last year more than 3,000 packages of bacteria cultures were distributed to cheese factories. Because it is difficult to get these

liquid cultures to the factories at just the right time, the bureau developed a dry culture of the eye-forming bacteria. In this culture powder is standardized so that the required number of bacteria for a single cheese can be put in one package, and a supply sufficient for two or three weeks furnished each factory.

Many cheese factories in Ohio, New York, and Wisconsin, including a number which had never before used pure cultures, cooperated in a campaign to introduce the new method into commercial production. Factories using this method have been able to control manufacturing conditions and to produce more uniformly high-grade cheese. Domestic Swiss cheese made by the culture method won first honors last year at the Ohio State Fair, at the Dairy Industries Exposition, and at the Ohio Swiss Cheese Convention.

A method of ripening Cheddar-cheese curd in the container in which the cheese is marketed has been brought to a point at which it may be commercially utilized. The curd, pressed and cut to size, is placed in a specially constructed container wherein it ripens normally without molding. There is no loss of moisture, and hence no rind is formed. The cost of canning is not excessive, and is partly offset by the elimination of shrinkage and paraffining. The department helped factories in 13 States in the South and Middle West in making Cheddar cheese. In the South, where cheese making is a comparatively new industry, specialists recommended changes in methods. As a result, many factories are turning out No. 1 quality cheese. At one factory the sales value of cheese produced increased at the rate of $4,000 a year.

A method of making uniformly high-quality cottage cheese was demonstrated. This product is known as the low-acid rennet type of cottage cheese. When made properly it has a rich creamy appearance, low acidity, good keeping qualities, and palatability. Cottage cheese is one of the most profitable outlets for by-product skim milk at dairy manufacturing plants, especially when it is of good quality.

Increased Interest in Casein

Increased tariff protection on casein has renewed the interest of domestic creameries in this product, and manufacturers sought aid in applying the new grain-curd method. Five plants in the East and one in the West adopted the method, which enables them better to meet the requirements of the paper-coating industry, the largest consumer of casein. Many western plants manufacture lactic-acid casein. Accordingly, the department this year developed a modification of the grain-curd method which can be used by any casein factory without additional equipment. If all the casein heretofore imported were to be made in this country, it would afford an outlet for about a billion pounds of skim milk annually.

By planning and taking part in educational programs, by sponsoring students' judging contests, and by giving assistance in the training of dairy inspectors, the department aided cities and communities in improving the quality of their milk supplies. Many producers followed suggestions offered to improve the quality of their milk. The program was also forwarded through 4-H dairy clubs, by milk-improvement campaigns on an area basis, and through cooperation with the Federal Board of Vocational Education.

Demonstrations and lectures on improving the quality of milk were presented at the three Rosenwald negro extension schools at Orange-

burg, S. C., Prairie View, Tex., and at Nashville, Tenn., before 303 negro extension workers. A resurvey of an important milk-supply area in Maine, where a milk-quality campaign had been conducted the previous year, showed marked improvement in the quality of the milk coming into shipping stations; 57 per cent of the patrons delivered grade 1 milk after the educational campaign, whereas in the year previous the percentage had been only 39.8. Conferences between officers of the United States Public Health Service and department specialists resulted in an agreement to promulgate a milk ordinance embodying recommendations of the two organizations, to serve as a guide to States, municipalities, and communities, in the sanitary regulation of local milk supplies.

PLANT INDUSTRY DEVELOPMENTS

Scientific discoveries and methods of cultivation that reduce costs of production on the farm have perhaps more value in periods of agricultural depression than at any other time. They are a sure means of increasing profits or, at any rate, of reducing losses. More efficient production need not be production in greater volume. Research that leads to increased yields per acre, to increased production of meat and milk per unit of feed consumed, or to improvements in the quality of farm products, though not the sole thing necessary to a profitable agriculture, is nevertheless indispensable.

Some notable contributions were made by the Bureau of Plant Industry to farm technology. This unit in the department has developed and promoted the use of better crop varieties, effected improvements in plant-disease control, and cooperated successfully with other agencies, public and private, in devising means for reducing spoilage in the transportation and storage of farm products.

Improved Varieties of Cotton

Special attention was given to the production of better qualities of cotton. Plant-breeding studies and variety tests have demonstrated that improved varieties which produce longer and more uniform fibers outyield the shorter staple varieties in some localities. These results indicate that the shorter staple varieties in the United States, which produce cotton that comes into direct competition in foreign markets with the short-staple cotton of India and China, could be replaced by longer staple varieties throughout much of the Cotton Belt with little or no sacrifice in yields. Accordingly the department is conducting an educational campaign to encourage the planting of the improved varieties that plant science has developed. It is emphasizing the need for larger quantities of strong and uniform fibers in the automobile industry and in the production of airplanes, balloons, dirigibles, and parachutes. It is stressing also the increasing demand for fine cotton fabrics in clothing. As a first step for regional improvement in cotton production, the need of "single-variety" cotton communities is being urged. This recommendation rests on the necessity for adequate supplies of select seed year after year. Seed can not be maintained varietally pure unless steps are taken to prevent its admixture with other varieties through cross-pollination in the field, as well as through the mixing of the seed in the cotton gin. A means of keeping the seed stock pure is to limit the production in each community to one variety.

New Varieties of Vegetables

Exceptionally good results were obtained in tests of new tomato variety, Break O' Day, which was developed by the department. This tomato is both early and wilt resistant. Break O' Day seed was released in some quantity to a large number of seedsmen all over the country. Except under conditions of abnormally high temperature, it has given unusually good results. The new tomato was received with as much enthusiasm as was the Marglobe tomato some years ago. It is nearly as early as the Earliana variety. It has a large globular red fruit somewhat similar to that of the Marglobe and yields well over a long period. These characteristics, with its resistance to wilt, make it perhaps the most important variety of early tomato introduced since the Earliana.

The department also released for extensive cooperative tests a potato variety called the "Katahdin." This variety is the result of many years of critical hybridization and selection in different potato regions of the United States. It was selected particularly for its resistance to mild mosaic disease. Among other good qualities it has unusual uniformity in the size and shape of the tubers and in their cooking qualities. It is high yielding, comparing favorably in this respect with Rural New Yorker and Green Mountain. It originated in 1923 as the result of a cross made in potato-breeding work. After six years of preliminary testing in Maine it was tested on a small scale in 1930 by a number of growers in widely separated sections of the country and seemed well adapted to muck and peat soils, but not to regions that have summer droughts.

Disease-Resistant Sugar Beets

Important results were recorded in the development of sugar beets resistant to the curly-top disease, which has caused heavy losses in the Western and Intermountain States. Disease-resistant strains have been developed by selection from commercial strains, and by crossing commercial beets with the wild beet of the Mediterranean area. Resistant-hybrid beets thus developed, when planted under moderately severe curly-top conditions, outyielded fields planted with commercial beet seed in the ratio of 3 to 1. They gave satisfactory yields, except under the most severe curly-top conditions. In one of the areas most seriously attacked by the curly-top disease a resistant strain provisionally called "Factory No. 1" outyielded a commercial strain by 4.3 tons of beets and 1,195 pounds of sugar per acre. In several places an increase of seed was obtained from this outstanding strain. Seed stocks from beets resistant to curly top are being increased as rapidly as possible, so that these improved strains may be introduced into commercial use.

Study of orchard-spraying problems resulted in slight, though important, modifications of technic in the handling of spraying materials under different conditions. Valuable information was obtained as to the handling of spray materials on different plant varieties and under different weather and cultural conditions. Considerable experimentation was done with new spraying materials. A public-service patent was taken out on a zinc-lime spray which is used to control bacterial leaf spot on peach foliage. This spray controls leaf spot without injury to the leaf; in fact it seems to stimulate the foliage. It was used with

arsenate of lead in two applications without doing any harm to the trees, and was also used without causing damage in combination with colloidal sulphur and arsenate of lead. Trees sprayed a dozen times, with the recommended strength of this spray, with two of the applications containing arsenate of lead, were not only uninjured but at the end of the season were the best-looking trees in the orchard in which the tests were made.

Control of Plant Diseases

Investigations completed late in 1930 showed threatening developments in the white-pine blister rust situation. A rapid and devastating spread of this disease was discovered in the commercial areas of western white pine in northern Idaho and in adjacent portions of Washington and Montana. White-pine stands over extensive areas will suffer maximum damage by the rust during the next 10 or 15 years unless the disease is controlled. Control is possible only by the systematic eradication or suppression, in or near pine stands, of currant and gooseberry plants (Ribes). This is a more difficult and costly task in the Western than in the Eastern States. Many of the pine areas are difficult to reach with labor and supplies; wild currant and gooseberry bushes are abundant; control measures must be concentrated within a short period each season; and mixed ownership of large tracts of wild lands makes control operations difficult. Control is nevertheless possible, provided effective methods are systematically applied on an adequate scale.

Distinct progress has been made in the control of stem rust of wheat through barberry eradication since 1918, when this campaign was started. In the 5-year period 1916–1920 the average annual loss to wheat caused by this rust, aside from its effect on the quality of the grain, was estimated at 57,000,000 bushels. In the 5-year period 1926–1930 the loss attributed to this disease was estimated at less than 10,000,000 bushels. In the interim millions of barberry bushes were destroyed. All told, more than 18,000,000 barberry bushes susceptible to rust have been destroyed in the 13 States of Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Montana, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin, and Wyoming. Recent research has indicated that different strains of stem rust, when growing on the leaves of the common barberry, may actually cross and produce new strains which may infect grain bred for resistance to the parent rust forms. Hence the barberry bush, besides carrying considerable quantities of stem rust over the winter in the spring-wheat areas, may also serve as a special breeding ground for new and dangerous forms of the disease.

Refrigeration of Perishables

For a number of years experimental studies have been made on the reaction of perishable fruits and vegetables to the temperature and other environmental conditions encountered during transportation and storage. The primary object has been to improve existing handling practices with a view to increasing the shipping radius and lengthening the period during which the products may be distributed to consumers in sound, wholesome, and attractive condition, with minimum risk of deterioration and at minimum cost.

Experiments made in cooperation with growers' organizations and transportation companies have developed a new method of refrigerating railway cars containing citrus fruits. So that growers may take advantage of this innovation the carriers agreed to an amendment, effective July 20, 1931, of the national perishable protective tariff. As a result shippers of oranges can obtain adequate refrigeration service at a considerable reduction in cost. On through shipments from California to points on the Atlantic coast the saving may exceed $30 a car.

The new method simply requires a "preicing" of the refrigerator car some hours before fruit is loaded into it. The fruit cools rapidly after being loaded, and less ice is required to keep it cool in transit. In some of the experimental transcontinental shipments only one transit reicing was necessary. In general, effective refrigeration during hot weather was obtained by a limited icing service, in which cars were reiced at three stations on the transcontinental trip. Much more frequent reicing and the use of considerably greater quantities of ice are prescribed by the old standard method.

Research into this specific problem was started in October, 1928, at the request of the California Citrus League, which believed that the refrigeration methods commonly employed on citrus fruits were unnecessarily expensive and wasteful of ice. The work involved the experimental icing and careful observation of the loading of more than 200 refrigerator cars moving over the principal routes at different seasons of the year.

It was found that in general the most satisfactory and the most economical refrigeration of oranges can be effected by preicing refrigerator cars from 12 to 18 hours before they are loaded. This practice, with limited reicing at selected points in transit, maintained temperatures comparing favorably with those in check shipments handled by the standard method—that is to say, without preicing but with frquent reicing in transit. Repeated tests during high summer temperatures proved the new method to be as satisfactory as the standard method of reicing at 9 to 11 separate stations for shipments en route from California to markets as distant as New York and Boston. At the reduced icing charges made available under the revised freight tariff already mentioned the limited-icing method effects important savings on direct shipments to eastern auctions and also on general shipments precooled and preiced by the shippers.

INSECT-PEST CONDITIONS

The 1930 drought was for the most part favorable to insect multiplication. It reduced disease among insects and aided their hibernation. As a result infestations this year were generally heavy. Notable exceptions occurred, however, including such important crop pests as the European corn borer, the Mexican bean beetle, the oriential fruit moth, and the plum curculio. Except in the case of the curculio, reductions in the number of these pests resulted chiefly from the wilting of leaves, which exposed eggs and young larvae to the sun, and from unfavorable food conditions. The plum curculio was greatly checked by the drying and baking of soil entered by the larvae. Surveys and field counts made in the fall of 1930 indicated that the European corn borer was reduced in numbers from 20 per cent in Michigan to about 60 per

cent in Ohio. It was much reduced also in Pennsylvania and Indiana. There was no important commercial damage from this insect. The Mexican bean beetle was reduced so much that control work was unnecessary in most sections. The plum curculio and the oriental fruit moth did very little commercial damage.

Exceptional grasshopper outbreaks were the most striking examples of increased damage. Heavy chinch-bug injury characteristically and normally follows drought conditions. It did so last year and again this year. The chinch bug is checked by humid conditions, which subject it to the attacks of a parasitic fungus. Codling-moth injury to apples and pears, which was greatly increased by the drought of 1930, extended into the present season. The infestation was the highest on record.

The summer of 1930 was favorable also to the common cattle grubs, *Hypoderma* species, and serious infestations were reported in 1931 from areas in the Red River Valley of the North, where previously these pests had been little known. Last year's drought also contributed to an exceptional outbreak of buffalo gnats, with resulting heavy injury to livestock in the lower Mississippi Valley. Normally such outbreaks follow unusual rainfall and floods, which enable these biting gnats to breed on submerged vegetation. In this instance the lowering of water levels resulted in a growth of vegetation on exposed stream borders and beds. This vegetation, when flooded by the return of normal rains, furnished favorable breeding conditions.

The southern pine beetle, one of the most destructive forest pests of the Appalachian regions, is favored by moisture deficiency. Losses caused by this insect in the 1930–31 season exceeded any experienced since 1910–11.

Grasshopper Outbreaks

The most notable insect damage of the year resulted from an unprecedented increase of certain grasshoppers which are always present throughout the Mississippi Valley States. The insects chiefly concerned are the 2-striped grasshopper and the differential grasshopper. Both are rather heavy-bodied species, and not migratory except in local movements. The differential grasshopper is a fairly strong flyer and under exceptional conditions may move a little more widely; but there are no records of its ever having been observed migrating in the true sense, that is in large swarms to distant areas. Hence this year's grasshopper damage has no relationship to the historic ravages by the Rocky Mountain locust in the seventies and eighties of the last century. The Rocky Mountain locust could fly hundreds of miles. It seems to have practically disappeared from the western plains, where it formerly occurred in myriads.

The situation this year was an outcome of two or three years favorable to local grasshopper multiplication and unfavorable to the fungous diseases and other natural control agencies that normally check increase. Furthermore, the winter of 1930–31 was exceptionally favorable to grasshopper survival, as were also the spring and early summer conditions of 1931. These conditions prevailed generally throughout the United States, from Texas northward to Canada and also east of the Mississippi. The heaviest damage occurred in the central part of South Dakota and the contiguous section in northern Nebraska.

Heavy grasshopper outbreaks in 1931 were predicted by Federal entomologists, and the need of preparation to fight the insects was

emphasized. Adequate steps, however, were not taken. Effective controls are possible chiefly against the "egg beds" and against the newly hatched hoppers. After the insects have reached practically full growth and are becoming winged, control becomes difficult or impracticable. The eggs can be destroyed by cultivating areas where the grasshoppers have collected for oviposition. The young insects can be controlled even more effectively by the use of poisoned bran baits as they emerge from egg-laying areas, or during their migration to small-grain and forage fields and later to corn.

The damage, though exaggerated in many reports, was so serious in its worst phases as to arouse general interest, and many demands were received for Federal aid for the poisoning of these hungry hordes of insects which threatened the destruction of thousands of acres of crops in the Great Plains area of the west. Unfortunately the department had no funds available for the purchase of poisons or for labor. All that could be done was to cooperate with State and local agencies in directing practicable control measures.

Abundance of hoppers and prospective damage were indicated early in May when hatching began over the areas of egg deposition, in some of which the eggs had been placed in the sod at the rate of 10,000 to the square foot. Over most of the area, before any important action was taken by the States concerned, the most effective period for control had passed. Some benefit would still have been possible had an adequate supply of poisoned bait, and means for its application, been available. In South Dakota, where operations were begun early in June, the commercial bait mixture used—24 carloads of which were distributed—contained poison at only half the required rate. The use of this bait was naturally disappointing. Toward the end of June a much better bait, prepared commercially under the proper formula, became available and gave excellent results. By this time, however, the movement of grasshoppers from small-grain and forage crops was well under way and many fields of corn had been destroyed. The distribution of poisoned bait at this time killed the insects that fed on it, but the enormous number of grasshoppers that continued to move into corn made it impossible to save the crops. It soon became evident that further large-scale poisoning for the season was a wasted effort, and a general determination was reached to conserve the funds made available by the States for use in the destruction of eggs in the winter of 1931–32, and particularly for the baiting of the young grasshoppers of next year's brood.

The outlook for 1932 can not now be definitely indicated. The situation may be more or less safeguarded by winter and spring conditions adverse to the insects. It seems desirable, however, to make preparations to prevent a repetition of this year's experience. This department will help to survey localities in which egg masses are likely to be deposited in large numbers, and to supervise the destruction of grasshopper eggs during the winter by cultivation. It will cooperate also in the more important work of poisoning the young hoppers early next season.

Mexican Bean Beetle

The Mexican bean beetle has now spread from the Southwestern States, where it has long been established, through the Southern, Central, and Eastern States and as far north as Canada, and continues to be the most important pest of the bean crop. Public interest in this

insect is greatly accentuated by the fact that it has made the kitchen-garden culture of beans as a table vegetable very uncertain. While the control of the bean beetle in commercial plantings for the market or for canning is readily obtained by three or four applications of magnesium arsenate, applied with adequate machinery and at the proper time as a spray, the similar control of the pest on garden crops is much more difficult. Not only is it difficult to have such spraying done as efficiently as to method and time, but more treatments are needed, because in such garden cultures the picking is extended over the longest possible period, whereas in commercial cultures it concerns usually only a few pickings over a much shorter period. Control is also possible with pyrethrum extracts. These materials are particularly useful on small garden plantings when it is necessary to apply a remedy after the crop has reached the bearing stage, since pyrethrum is nonpoisonous to man in the dilutions used to control the beetle.

The effect on the bean beetle of the long drought and high temperatures of 1930 was to reduce the winter carry-over of this pest. Damage from it during the current season was much reduced. No permanent natural control of the bean beetle by parasites has been developed in this country. Attempts have been made to introduce a parasite from Mexico, but it has proved difficult to carry the insect over the winter. In the winter of 1930–31, however, a large number of parasites were bred in a greenhouse and liberated. The establishment of this beneficial insect should help to reduce the bean-beetle menace.

Japanese Beetle

The Japanese beetle is becoming less abundant in the sections reached first in its spread from where it was introduced in New Jersey. This is partly a result of natural controls—diseases and parasitic insects—such as normally come, although often slowly, in the case of most introduced pests. Some of the decrease, however, may be credited to the importation from Asia of foreign parasites of the beetle. This work has established considerable numbers of certain enemies of the beetle and its grub in the invaded area.

Artificial control, through baits and insecticides, is becoming more effective. The beetle, however, is very resistant to poisons, and the grubs must be reached by difficult soil treatments. A new phase of control has been developed this year in the application of a dust to sweet corn at the beginning of the "silking" stage. This protects the silk from attacks of the beetle, and thus safeguards the growing crop. Another recent development has been the successful application of acid-lead arsenate to soil in nursey plantings and to lawns for the destruction of the grubs—a required condition in the shipment of nursery stock under the Japanese-beetle quarantine.

Mediterranean Fruit Fly

Research work on the Mediterranean fruit fly has been concluded in Florida but is being pushed in Hawaii. In Florida investigations initiated in the eradication effort of 1929 were completed. The results will help in the control of the pest should it again get a foothold in the United States. Important studies deal with the action, harmful or otherwise, of arsenic, copper, and other bait sprays on citrus and other fruit trees, and with the cultivated and wild fruits of Florida which are

possible hosts of the fly. A study has been completed also of certain native fruit flies which occur in Florida. This assembles much information which will facilitate the determination of any suspected maggots in fruit, and their easy separation from the dreaded Mediterranean species. Studies of the insect itself and its control in relation to its various host fruits have been conducted in Hawaii since the end of 1929. The University of Hawaii built specially designed laboratories and offices for the department's workers, and set aside land for experimental plantings. Closely related is a study of the native fruit flies of Mexico, in which the Mexican Department of Agriculture cooperated.

A New Pest of Stored Tobacco

A serious type of insect injury to stored leaf tobacco developed during the year. It was caused by the larvae of a cosmopolitan moth, *Ephestia elutella*, which hitherto has not been at all abundant or even destructive in the United States, and in this and other countries has confined itself largely to stored vegetable foods. In such associations it has been several times reported in the United States. Early in August, 1930, it was found to be heavily infesting stored leaf tobacco in an isolated area in the bright-tobacco belt. Thousands of moths were flying about in the warehouses, and the feeding of the larvae had extended 3 or 4 inches into the tobacco as stored in hogsheads.

Following the report of this injury, a thorough investigation was made which indicated that the infestation was confined to five warehouses. Some 31,000,000 pounds of leaf tobacco valued at $10,500,000 were involved, infestation being heaviest in the more valuable grades. The warehouses containing this tobacco were given drastic fumigation in August of last year and a second and even heavier fumigation in June of this year. These fumigations largely eliminated the pest. The moth must, however, be reckoned with as a future potential pest of leaf tobacco.

Arsenic-Residue Problem

In the last 50 years various arsenical insecticides have become standard for the control of many fruit and vegetable pests. A result is the arsenic-residue problem, the urgency of which increases with the wider use of arsenicals, and with the enforcement of restrictions as to arsenic tolerance in products both for domestic use and for export. In fruits this situation is met by washing them either in diluted acid or alkali, but the problem can not be considered solved until a remedy is found that will control the codling moth, the Mexican bean beetle, and similar pests, and will not leave an objectionable residue.

In the case of the codling moth, hope is now seen in certain fluorine compounds. Two—barium fluosilicate and cryolite—gave satisfactory results in field tests conducted in the Pacific Northwest in 1930 and again this year. These compounds and others have proved inadequate for the control of the codling moth in humid sections, but the results obtained in comparatively dry regions suggest the possibility of adapting them to other climates. Another alternative for arsenicals is the use of a mixture of nicotine sulphate in a dilute white-oil emulsion—a combination which has given fairly good results when used against the apple worm in the Northwest, but has again been less satisfactory elsewhere.

Black Fly

This department and the Cuban Department of Agriculture completed this year a cooperative project looking to the control of the black fly, a pest attacking the leaves of trees and not the fruit. It is the most important enemy of citrus trees in Cuba and other islands of the West Indies and in Central America. The risk to the Florida citrus crop is obvious. The original home of the black fly was believed to be in southeastern Asia, and it was known that natural parasites of this pest occurred there which, if imported, might accomplish effective control. The Cuban authorities offered to make this attempt and to assume the operating costs of the undertaking if the department would supply technical personnel. This was done with notable success. Several different types of minute wasp parasites were introduced. One of these, *Eretmocerus serius*, multiplied to an extent that permitted liberations throughout Cuba, and also the establishment of colonies in the Canal Zone and Haiti. For Cuba the black-fly menace is now looked upon as fully controlled. All groves in which colonies of the parasites were established prior to October, 1930, are now commercially free from the fly. A number of coccinellid beetles were also introduced. One of these has proved able to do effective work, though not with the certainty of the parasite *Eretmocerus serius*. A sympathetic attitude toward the collection and importation of insect parasites has developed throughout the world. The United States has benefited, and has extended benefits to other countries. For example, the department this year, in response to a request from the Government of Spain, transmitted to that country a considerable shipment of an important parasite of the Mediterreanan fruit fly, long since established in Hawaii but not occurring in Spain. This shipment reached its destination and is being successfully propagated there.

PLANT QUARANTINES

The work of the department in the eradication of the Mediterranean fruit fly in Florida was so successful that on November 15, 1930, all the restrictions on the movement of Florida products on account of this insect were removed. The last infestation was found in a dooryard in St. Augustine, Fla., on July 25, 1930. Suspension of field inspection was necessitated by lack of funds from March 27, 1930, to June 13, 1930. Funds were made available on the latter date, and inspection was resumed. This work was done by from 220 to 750 inspectors until March 31, 1931, when it was discontinued. The quarantine maintained in Florida from May 1, 1929, to November 15, 1930, prevented the spread of the insect to other States. Moreover, it assured open markets for Florida's products. States receiving these products accepted them with reasonable certainty that their fruit and vegetable industries were not jeopardized.

Similar results attended the enforcement of other quarantines by the department. A notable illustration is the Japanese-beetle quarantine. Products within the infested area are inspected by the department and certificates are issued which, so far as Japanese beetle is concerned, carry the plants to their destination and insure their acceptance. Experiments conducted during the year made it possible to modify the Japanese-beetle quarantine restrictions on products moving out of the

infested area in such a way at to permit greater freedom in shipping them. Nurserymen and others affected cooperated willingly with the department in endeavoring to retard the spread of this insect.

Gipsy-Moth Control Work

Quarantine and eradication work accomplished the apparent extermination of the gipsy moth in a large area in the State of New Jersey. In 1921 more than three million egg clusters were found in an area of approximately 400 square miles. Eradication measures were undertaken in cooperation with the State Department of Agriculture of New Jersey. No gipsy moth, in any stage, has been found in this area since May, 1929.

The gipsy moth has been abundant in New England since 1889. For years its westward spread was gradual but steady. Eight years ago the department, with the cooperation of the New England States and the State of New York, established a barrier zone about 30 miles wide extending from the Canadian line to Long Island Sound. This zone is in the eastern part of New York State and the western parts of Massachusetts, Connecticut, and Vermont. Inspections are made by the department and by the State of New York, and any infestations found are exterminated. So far as is known no infestation has become established west of the barrier zone.

Pink Bollworm of Cotton

The pink bollworm of cotton, which is established only in comparatively small areas in the southwestern section of the United States, constitutes a serious threat. Eradication is undertaken where it seems practicable, and efforts are made in all infested areas toward preventing the spread of the pest to the main cotton-producing regions. The first necessity is the determination of the infested areas. Remarkable progress has been made in this work through the development of machines which separate any pink bollworms which may be present in gin trash. Each machine does the work of many men, and does it better. These machines, supplemented by the gathering and inspection at a central point of representative samples of cotton bolls throughout the Cotton Belt, made possible in the 1930–31 season, for the first time, a fairly comprehensive analysis of insect conditions in the main Cotton Belt. No pink bollworm infestation was discovered in the main cotton-growing areas.

Tests conducted in the fumigation and compression of baled cotton lint permitted the removal of certain fumigation requirements in areas known to be lightly infested by the pink bollworm. This modification of the quarantine saved many thousands of dollars to cotton producers, without increasing the risk of spreading the insect to areas not now infested.

Maintenance of the European corn-borer quarantine prevented this insect from reaching the main corn-producing regions of the United States and afforded more time for perfecting control operations.

Inspection forces at the ports of entry in the United States have been substantially increased. This not only gives better protection against the importation of injurious pests but permits the entry, under proper supervision, of larger numbers of plants which can safely be admitted.

CHEMISTRY AND SOIL RESEARCH

Investigations in the Bureau of Chemistry and Soils brought some significant results in the protection of foods and other farm products against various destructive influences, in the utilization of farm by-products, in soil conservation, and in the adaptation of fertilizers to particular soil requirements. Further progress was made in the development of important new insecticides. Specialists in the bureau cooperated with farmers and manufacturers in developing practical applications for recent chemical discoveries, and also in experiments undertaken to test, on a commercial scale, some of the more promising laboratory results.

Losses from the spontaneous heating of hay are not confined to the burning of barns and other farm property. Damage of this sort, though estimated to exceed $20,000,000 annually, is multiplied many times by the loss that results from the decrease in weight and nutritive value of hay which occurs during spontaneous heating. This country's hay crop has an estimated average annual value of about $1,300,000,000. At least a tenth of our harvested grass crop is destroyed by spontaneous heating. Experiments conducted with experimental barns and other equipment have thrown new light on the spontaneous heating and combustion of hay. It is now believed that hay bacteria, in the parts of the haymow from which air is excluded, produce unstable compounds that undergo rapid oxidation when air is accidentally admitted with a development of heat rapid enough under certain conditions to set fire to the hay. If this proves to be the case, an important step will have been taken toward the discovery of practical means of reducing losses from spontaneous heating.

Experiments conducted over a period of eight years resulted recently in proof that leather absorbs sulphurous and sulphuric acids from the gaseous pollutions of the atmosphere. This is one cause and perhaps the primary cause of the relatively rapid rotting and short life of many leather goods, such as harnesses, bookbindings, upholstery, and bags. Paper also, experiments showed, may be damaged by the absorption of gases from the air. Accordingly, research is being directed toward the discovery of types of leather and paper that can withstand this deteriorating influence. Efforts are being made also to develop, for leather, protective dressings or treatments.

Fumigants and Insecticides

In experiments with new fumigants and insecticides extremely promising results were recorded. Ethylene oxide, a fumigant discovered by the department in 1927, is made more effective when mixed with carbon dioxide, and also is free from fire or explosion hazard. This fumigant is used in the fumigation of grain, foodstuffs, and other commodities. Following a hearing before the examiner of interferences of the United States Patent Office, in which the priority of the department in the use of ethylene oxide as a fumigant was upheld against the claims of certain German inventors, a public-service patent for the discovery was issued to two members of the department. Thus the fumigant was made available to all American citizens, and its wide use encouraged.

The department recently developed a synthetic organic compound which is more toxic than nicotine when sprayed upon aphids. Nicotine, one of the most valuable insecticides used by orchardists, truck-

crop growers, nurserymen, and florists, is not available in sufficient supply. The new synthetic substitute is called neonicotine. One of the largest manufacturers of coal-tar products is making an insecticide which contains neonicotine as its active ingredient. A common Russian weed, *Anabasis aphylla*, was recently found to contain as much as 2 per cent neonicotine and related alkaloids. Efforts are being made to introduce the cultivation of this plant into the United States.

Utilization of By-Products

Chemical research is steadily accumulating knowledge useful in the utilization of agricultural by-products. Sugarcane bagasse, a material formerly produced in amounts smaller than those required by the insulation-board industry, is now, as a result of the introduction of mosaic-resistant varieties of sugarcane in Louisiana, produced in excess of the demand. Studies showed methods whereby bagasse may be made a source of cellulose equal to any now available, except that manufactured from cotton linters. Cellulose from bagasse, it is hoped will find an application in the rayon and the nitrocellulose industries. Several new compounds were obtained this year from lignin, a substance present in the straw, stalks, hulls, and other cellular residues of leading crops. Some of these new compounds seem likely to be useful in the pharmaceutical and chemical industries. Lignin has possibilities also in the production of synthetic resins, dyestuffs, and tanning materials.

Means have been developed for the production of fine-quality starch from sweetpotatoes of any variety, regardless of whether or not they have been stored. This discovery has promising economic possibilities, because the percentage of culls in the sweetpotato crop is large At present cull sweetpotatoes are either wasted or inadequately utilized. In a vegetable crop second in importance only to the potato crop, a cull problem of this magnitude obviously demands a remedy. From 10 to 20 per cent of the sweetpotato crop consists of oversize or undersize sweetpotatoes that must be classed as culls owing to the stringency of market grades. Sweetpotato starch has properties generally similar to those of potato starch, a commodity imported into this country in large amounts.

Industrial uses may be found for the waxy coating of apples. Research recently showed that this coating consists principally of a paraffin hydrocarbon, a solid alcohol, and a hydroxy acid known as ursolic acid. A commercial research laboratory experimented with these materials, and reported that they might be commercially valuable, particularly in retarding the drying and in improving the gloss and water resistance of cellulose lacquers. Crude ursolic acid may find a commercial application as a waterproofing material. The sodium salt of ursolic acid acts as an emulsifier of water in oils. The paraffin hydrocarbon has properties that suggest its use in paint and varnish removers. It has been estimated that nearly half a million pounds of each of the principal constituents above mentioned could be recovered from the residues obtained in the canning of apples, in cider and vinegar making, and in the dehydration of apples. Many commercial firms are seeking industrial uses for these apple-surface compounds.

Research in the department and in the State experiment stations has shown that copper is an essential requirement of plants and animals. Traces of copper added to certain unproductive soils lacking copper

make these soils productive. Anemia in man and in animals may often be corrected by the use of foods containing copper. Experiment station workers discovered that the so-called salt sickness of cattle in certain parts of Florida results from a deficiency of copper in their forage and other foods.

Progress of Soil Surveys

In the last fiscal year the department completed a detailed mapping and description of 28,530 square miles of soils in 30 States and in Porto Rico and the Virgin Islands. In addition it made reconnaissance surveys of 10,014 square miles in Minnesota, Montana, Oklahoma, and Vermont. This work brought the entire area mapped and described since the soil survey was begun to 1,449,792 square miles, or 927,866,880 acres. Knowledge gained in soil surveys is the basis of some important recent agricultural developments. In Georgia, for example, soil surveys located and ascertained the quality of certain soil types adapted to tobacco. Trials were made, the tobacco crops succeeded, and tobacco growing developed within a few years from a comparatively unimportant position to one in which it stands second in value among the crops produced in Georgia. By other soil surveys certain soils in the piedmont section of Georgia were found suited to alfalfa, and this crop is now spreading there rapidly.

Soil studies often indicate profitable fertilizer practice. A good example is the growing practice of applying small amounts of phosphatic fertilizer to sugar beets. This practice, the economy of which was determined by soil specialists in the Bureau of Chemistry and Soils, increases yields about 3 tons of sugar beets per acre, and is widely used throughout the western beet-growing territory. This pioneer work has increased the value of the sugar-beet crop in the western sugar-beet area by $4,000,000 or $5,000,000 annually. Beneficial results have likewise followed fertilizer experiments conducted in the principal sugarcane areas of Louisiana. In an important strawberry-growing district of North Carolina, growers formerly used about 1,500 pounds per acre of a well-balanced fertilizer annually. They put this down in two applications, one in late summer after the berries were harvested, and the second in the following winter. Tests showed that yields may be greatly increased by applying all the fertilizer in one application late in the summer or early in the fall. This simple change, in various tests and eventually in commercial practice, produced from 400 to 500 quarts of berries per acre more than the split applications previously used. Furthermore, the berries matured earlier. Strawberry growers in the Chadburn district of North Carolina, by using the new method of applying fertilizer, received this season about $75 an acre more than they would have received had they used the old method.

Fertilizer Studies Productive

Recent experiments have shown that concentrated fertilizers are often more effective when, in addition to nitrogen, phosphorus, and potash, they contain some or all of the less common essential elements for plant growth. These include calcium, magnesium, manganese, copper, zinc, nickel, and boron. On some soils, synthetic and concentrated fertilizers of the sort commonly sold have a low efficiency, which is too marked to be the result of improper distribution or placement of the fertilizer. The trouble may be a shortage of some rare essential chemical. Manganese was found to be deficient in soils in a large area

in Florida, and in a group of soils on the Atlantic seaboard further north. By supplying this essential element, growers have netted good returns from land that was formerly unprofitable. Extensive areas formerly barren now produce a variety of truck crops for the northern markets.

Chemical research under way has an important bearing on the fertilizer industry. The farmers of the United States in recent years have spent about $250,000,000 annually for commercial fertilizer. So that they may get more value for this expenditure, the department conducts investigations to learn how nitrogen, phosphoric acid, potash, and other materials may be more effectively converted into fertilizers; how methods of applying fertilizers may be improved; and how sources of fertilizer materials may be developed. This last-mentioned item is particularly important because the United States is still dependent on foreign sources for no less than 80 per cent of the potash used in agriculture. American potash production is increasing, however, and now supplies annually about 100,000 tons of fertilizer salts. An important potash mine, producing water-soluble potash salt, was recently opened in New Mexico. Various potash materials exist in great quantities in various parts of the United States, and the department is studying how these may be commercially developed. Recently published results of research on blast-furnace problems are expected to have a favorable influence on the production of potash and phosphoric acid fertilizer in the United States.

Ammonia in Superphosphates

One of the most interesting recent developments in fertilizer manufacture is the direct use of ammonia in the treatment of superphosphates used in the manufacture of mixed fertilizers. This has certain advantages combined with disadvantages. This ammonia-treated superphosphate in fertilizer mixtures improves their mechanical condition, prevents rotting of the bags, and gives a more highly concentrated fertilizer. On the other hand, the availability of the phosphoric acid is reduced. Accordingly, the proportion of free ammonia which can be used economically in the manufacture of fertilizer mixtures is limited to about one-fourth or one-third of the maximum that could be included. Studies recently showed, however, that the use of free ammonia in fertilizer manufacture should not reduce the availability of the phosphoric acid as much as was supposed. Experiments made in this connection were confirmed at agricultural experiment stations throughout the country. Interest in this problem was so great that more than 25 research institutions participated in the tests, which showed that it should be possible to double the quantity of free ammonia used in manufacturing fertilizer mixtures without appreciably lowering the value of the phosphoric acid. Accordingly, State officials are taking steps which will permit an increase of about 100 per cent in the use of free ammonia in fertilizer manufacture. This will mean an increase of about 80,000 tons per annum in the use of synthetic ammonia. This quantity is worth at wholesale about $8,000,000. The direct use of ammonia in fertilizer mixtures has the added advantage that it improves their drillability, and promotes a more uniform distribution in the field. Tests at State experiment stations have shown that a uniform distribution of fertilizer gives at least a 10 per cent saving.

Soil-Erosion Problems

Erosion, which annually removes fully 500,000,000 tons of soil from the farms of the United States, is the subject of extensive investigations. Two stations for the experimental study of soil erosion were established during the last year in the States of Washington and Iowa. Six similar stations had been previously set up. These are located in Oklahoma, Kansas, Mississippi, Missouri, Texas, and North Carolina. The new stations are in the Washington-Oregon-Idaho wheat belt and the rich loessial Corn Belt soil area of the Missouri River Valley, in both of which regions erosion is a serious problem. Funds for an erosion-control and moisture-conservation program were appropriated by Congress in 1930.

It was demonstrated during the last year that on certain moderately steep slopes, some soil types erode so rapidly that it seems impossible to utilize the land for clean-tilled crops except by strip farming, with terracing and the use of soil-saving crop rotations as well. These methods, however, promise to be very effective. Subsoiling in alternate strips is also under experimentation. Terracing proved valuable in the rolling parts of the red plains of Oklahoma, not only in slowing down erosion but in partly rehabilitating eroded land. At the erosion station in Missouri, a field badly damaged by sheet erosion and gullying was reclaimed by constructing small dams in the gullies. These dams were made with old fertilizer sacks filled with soil and bluegrass roots. The bluegrass roots grew through the bags, took hold of the ground, and established "living" dams, which quickly silted in from above with the first rains. Between the dams the gullies were seeded to wheat, which grew well. This experiment, because of its practicability and cheapness, attracted wide attention. At the Oklahoma station it was found that cotton from eroded land has less strength than cotton from uneroded land, and that the seed contains considerably less oil. The average depth of the topsoil of our uplands is only about 9 inches. In some localities this is being washed off at the rate of 1 inch in from four to eight years. In losing this layer, which contains far more plant food than the unweathered raw subsoil, the farmer is losing his principal capital. Better protection of erosive cultivated areas is a national necessity.

A representative of the department, with the cooperation of a representative of the Kansas Agricultural Experiment Station, has built a cultivator which promises to prove effective as a means of conserving soil and water in that region, and possibly in other regions, by causing more of the rainfall to sink into the ground, thus reducing erosion. This machine can be used both as a cultivator for row crops and as a surface-tillage implement for fallow. It digs approximately 10,000 holes per acre, each hole having a capacity for holding 2 to 3 gallons of rain water. Although the holes collectively impound a large amount of water, their greatest value comes from the fact that the water is held still and given a chance to soak into the ground.

FORESTRY

The forestry work of the department supplements its work for agriculture. Agriculture and forestry apply the same basic sciences to the same basic end of land use. Which is preferable in any given case de-

pends partly upon the physical factors that determine crop productiveness, and partly upon economic and social requirements. Continued overproduction of agricultural products has made conspicuous a need to find other ways of making serviceable a vast aggregate of potentially cultivable land. There is also the vast acreage of forest land which has no agricultural possibilities at all. The department seeks to find out how to make forestry a good form of land use and how to utilize the products of the forest to best advantage; it seeks to bring about the application of suitable forestry practices; it administers the national-forest enterprise; and it cooperates with the States for the promotion of forestry under the terms of the Weeks, Clarke-McNary, and amendatory laws.

Forest Improvements

Congress increased the funds for national-forest improvements from $645,000 for 1930 to $2,500,000 for 1931. Nearly all of this was for improvements to facilitate fire control, chiefly roads and trails. Additional road and trail funds provided elsewhere in the agricultural appropriation act, in the second deficiency act, 1930, and under the continuing appropriation of 10 per cent of the national-forest receipts exceeded by $3,545,168 the corresponding amounts for the previous year. A further increase of $6,354,800 was made in the 1931 appropriations under legislation providing for emergency constructions of various kinds, chiefly road building, and for emergency work in the control of insect infestation. On the other hand, various cuts in appropriations for national-forest purposes other than improvements, and for fire fighting, reduced by more than $2,000,000 the funds thus made available.

All told, Congress appropriated for national-forest improvements nearly $20,500,000. In part this was inspired by the policy of the administration and of Congress to increase employment. What was accomplished by the Forest Service in this field is related elsewhere in the present report. The Forest Service happened to be peculiarly prepared to expand construction work along needed and approved lines. It had a carefully worked out long-time improvement program for the national forests, and its organization provided the necessary leadership for immediately inaugurating a large number of local projects.

Fire Protection

To give the forests efficient and economical protection and to bring about full use of their resources necessitates a large investment in roads and trails, lookout houses, cabins and other administrative structures, telephone lines, and many other improvements. As protection is facilitated fire losses are reduced and the heavy costs of suppressing great fires are less frequently entailed. To complete the entire improvement program for the national forests will require a further large outlay; progress must necessarily be adjusted to the financial exigencies of the Government. That the improvements already constructed are proving a sound investment the results obtained in protecting the forests during the severe fire season of 1930 and the current year clearly show. A major advance in solving the extremely difficult problem of fire control in the West can with some confidence be claimed.

The heart of the problem is how to stop fires in bad years. Such years occur irregularly. They are the result of unfavorable weather—abnormal heat, violent winds, very low atmospheric humidity, and electric storms with heavily "bunched" lightning. Since 1905 the bad years have been 1910, 1919, 1924, 1926, 1929, 1930, and 1931. Recent years have witnessed a cumulative shortage of precipitation that has reduced the supply of ground water and affected vegetation. In most respects 1930 was as bad a year as almost any of its predecessors. But while the area burned over in the preceding five years averaged 0.29 per cent of the entire national-forest area annually, the 1930 fires were held to 0.11 per cent of the entire area.

In 1929 nearly 800,000 acres were burned over; in 1930 less than 140,000 acres. Yet the 8,388 fires in 1930 exceeded by 12.6 per cent the number of those in 1929.

In 1930 the fire-fighting expenditures, exclusive of the time of forest officers, were less than $1,200,000, as against more than $3,200,000 in 1929. The fire damage in 1930 was estimated at less than $350,000; in 1929, at nearly $4,340,000. The difference was due partly to better preparedness. This was made possible by the larger provision of funds for improvement construction and for fire-fighting equipment. The whole work of suppression has been raised to a new level of efficiency and speed, so that fewer fires attain large size and those which do are held within narrower limits and are much more quickly brought under control.

Extension and Consolidation of National Forests

Sound principles of land economy and public interest seem to dictate both the extension and better consolidation of the national forests by (1) the addition thereto of the remaining public lands most valuable for timber production and stream-flow protection, and (2) the acquisition of privately owned lands within national forests by exchanges therefor of national-forest lands or stumpage in the Western States and by purchase under the Weeks and Clarke-McNary laws in the Eastern States.

A recent study shows that of the remaining unreserved and unappropriated public lands in the Western States some 19,000,000 acres are of such importance for timber production or stream-flow protection as to suggest that the addition to the national forests of a considerable part thereof would be in the public interest.

More than half of the State and private lands within national-forest boundaries in the Western States and several million acres of similar lands outside but contiguous to the national forests are integral with the public properties. The acquisition of such lands through exchanges to the possible extent of some 15,000,000 acres or more demands eventual consideration. Many opportunities for land exchanges advantageous to the United States are now available, but can be approved only where they do not involve any appreciable reduction in timber-sale receipts or the proportion thereof payable to the counties.

To date Congress has enacted a total of 66 laws authorizing the Secretary of Agriculture, with the concurrence of the Secretary of the Interior, to exchange national-forest lands or stumpage for privately owned lands within or contiguous to national forests where such ex-

changes will consolidate and improve the public properties. The net result of these 66 acts, as of December 31, 1930, has been the consummation of 691 exchange cases whereby the United States has acquired 1,005,527 acres of land valued at $4,119,155 in exchange for 291,697 acres of national-forest land valued at $1,538,278 and 768,563,000 board feet of national-forest stumpage valued at $2,096,789. Besides the net gain of 713,830 acres in national-forest area, the volume of stumpage on the acquired lands is greater than that surrendered. During the year, 157 new land-exchange cases were approved and submitted to the Secretary of the Interior. These contemplate the conveyance to the United States of 304,906 acres of privately owned lands in exchange for 30,890 acres of national-forest land and $570,844 worth of national-forest stumpage.

East of the Great Plains the national-forest lands now comprise 2,482,746 acres reserved from the public lands and 4,675,020 acres acquired by or in process of purchase under the Weeks and Clarke-McNary laws. The program approved by the National Forest Reservation Commission contemplates the ultimate acquisition of approximately 9,000,000 acres more, or eventual Federal ownership of approximately 16,000,000 acres, which would be about 4.3 per cent of the estimated forest-land area east of the one-hundredth meridian. By the act of March 3, 1931, the purchase of not to exceed 50,000 acres for addition to the Luquillo Forest in Porto Rico was authorized by Congress.

During the year nearly 550,000 acres were approved for purchase at a cost of approximately $1,944,000. The rate of progress is determined by the yearly appropriation, which since 1929 has provided $2,000,000 annually. In accordance with the administration program for curtailment of expenditures the disbursement from the 1932 appropriation will be limited to $1,700,000.

The transfers of land from national forests to national parks made during the year are instances of a long series of proposals of such transfers which have been almost continuous for 20 years. A number of the western national parks have been created from portions of national forests, and several others are surrounded by national forests. Necessarily many question as to the best boundary adjustments have arisen. Often the proposals have originated in local desires for anticipated local advantages. Each accomplished transfer has required a specific law. It should not be difficult to formulate definite standards of quality and function that will afford clear-cut differentiation between the lands that will serve their highest public usefulness as national parks and the lands more suitable for national forests. The problem in every case is one of social, industrial, and political economy readily determinable by systematic analysis of major factors in the light of established principles of public policy. Local pressure for one or the other form of administration ought not to control the decision, as against the large public interest. The efforts of the two services charged with the responsibility for administering these two Federal undertakings to develop a common viewpoint on the principles and purposes that should mark off their respective fields and a procedure for resolving doubtful questions as to the areas best suited to one or the other form of administration, would be much more effective if a definite public policy were determined and established.

Forest Receipts

The receipts from the national forests totaled $4,993,320.08, a decrease of $1,758,233.14, due to decreased receipts from timber, which were only slightly more than $2,600,000. Grazing receipts, on the other hand, of nearly $2,000,000, were a little greater than those in 1930, as were also the receipts from miscellaneous land uses; these came to more than $400,000. Timber-sale receipts reflected chiefly the nation-wide decrease in lumber production.

Overproduction and market demoralization have been chronic in the lumber industry for years. The national-forest timber-sale policy has therefore withheld offerings of timber that would initiate new manufacturing enterprises except to utilize overmature stands, to check insect infection or disease epidemics, to salvage dead or dying timber, or to assist dependent local communities. On the other hand, where going mills needed new timber national-forest stumpage has been made available, to promote industrial and community stability. By direction of the President, the policy of restriction of national-forest timber offerings was given redefinition and added emphasis near the close of the year. During the present economic situation sales in excess of $500 will be made only to supply the needs of existing sawmills dependent for their new material upon the national forests and unable to obtain it elsewhere, to furnish domestic paper mills with raw material needed to supply the domestic market with newsprint and other wood-pulp products, and to dispose of windthrown, insect-infested, and fire-damaged or fire-killed timber.

Cooperation with States in Forestry

Cooperation with States for the promotion of forestry is provided for under the Weeks, Clarke-McNary, and amendatory laws on a scale set by the annual appropriations. The forms of cooperation are: (1) Maintaining organized systems of protection against forest fires; (2) producing and distributing to farmers forest-planting stock; and (3) farm-forestry extension. In 1931, 45 States and 2 Territories cooperated in at least one form, 20 States in all three forms, and 19 in two. To the cost of protection the cooperating States contributed $4,000,000, and to planting-stock production and distribution nearly $250,000. The ratio of State to Federal expenditures for the first purpose was 3 to 1, and for the second, also 3 to 1. In addition private agencies contributed to the protection funds $1,100,000. The area protected, 228,000,000 acres, was about 4,000,000 acres greater than that protected the previous year. Since 1925 there has been an increase of 50,000,000 acres, and an enormous upbuilding of State forestry activities, legislation, and general public interest.

The laws authorizing the three forms of cooperation limit Federal participation in each State to one-half the total outlay in that State, for the same purpose. With appropriations that do not permit a Federal matching of State expenditures, the department seeks to apportion the amount available along the most equitable and serviceable lines. The Federal participation varied from an even division of the cost in 10 States to a less than one-seventh share in 4 States. For all States combined the Federal funds made up 25 per cent of the total expenditures, State funds 60 per cent, and private funds 15 per cent.

When the Clarke-McNary law was passed, it was commonly held that for private forest land the owners should meet half the cost of protection, with the States and the Federal Government dividing equally the other half. It has become plain, however, that a large portion of the private forest land in the country is not regarded by its owners as having sufficient promise for permanent timber growing to be worth protecting at their own cost after the merchantable stand has been removed. The prospect is that much cut-over land will be abandoned in preference to paying taxes on it. The necessity of meeting protection costs, where this is required, makes abandonment the more probable.

Research in Forestry

The use of private land, whether now forested or cleared, for timber growing, hinges on the returns that can be looked for. Timberland owners will not make expenditures to keep their lands productive without a reasonable prospect that the investment of capital involved will turn out well. It is common to assume that timber raising is bound to pay. The lumber industry, on the other hand, is profoundly discouraged regarding the future. Enough is not yet known about costs, future returns, and methods to afford private capital an adequate guide as to where to practice forestry and what kind of forestry to practice. Further research, economic, industrial, and silvicultural, is necessary. It is needed as a guide to public policy and a requisite for public forestry, no less than as a means for furthering private forestry.

The appointment by the President of a timber conservation board has given prominence to the need for better economic data on the whole timber situation. The Forest Service is carrying forward a comprehensive long-time program of forest research, chiefly through a system of regional forest experiment stations as a central laboratory for research in forest products. The forest experiment stations conduct economic as well as silvicultural research. They are making real headway in building up the body of knowledge necessary for forestry.

WILD LIFE

The Bureau of Biological Survey has continued research work for the solution of complex problems in the conservation and propagation of waterfowl and big game and fur mammals, and in the protection of insectivorous birds and other forms of wild life. It has continued cooperative work for the control of economically injurious species.

The cause of wild-duck sickness, long a baffling problem, was determined during the year. This disease has been taking an intermittent but heavy toll from waterfowl and shore birds for more than two decades. During certain years the mortality on some of the important concentration areas has been far greater than the total kill there by hunters. Though earlier studies (in 1914–1916) conducted under the highly saline conditions about Great Salt Lake, Utah, pointed to certain alkaline salts as the cause, evidence from the past two years' study in Oregon, California, and Utah has demonstrated that the disease is a form of botulism produced by a toxin liberated by bacteria that thrive in decaying animal and vegetable matter. Technically the organism is *Clostridium botulinum*, type C, best known as a cause of limber neck in domestic poultry. Remedial measures can now be taken to prevent

high concentrations of alkaline water; this will serve as a preventive of the duck sickness as now understood, because the substitution of deep fresh water of a constant level for expanses of shallow water and mud flats, with their attendant decay of organic matter, eliminates important factors favorable to the disease.

To coordinate wild-life disease investigations a new unit was established this year in the Bureau of Biological Survey, under which cooperation was continued with other bureaus of the department and with the Universities of Minnesota and Southern California. Close observations on concentration areas of wild fowl, on numerous fur and game farms throughout the country, on game refuges, and on large areas of controlled natural habitat have made it evident that disease takes a large toll of wild life and that conservation measures should include disease control as developed by research.

Observations in Drought-Stricken Waterfowl Grounds

Investigations conducted throughout the entire country, and on important breeding grounds in Canada, indicate that the status of migratory waterfowl is more serious generally than at any time since the need was recognized for the migratory-bird treaty of 1916. Drought conditions on the breeding grounds in Canada and in the western part of the United States increased in intensity during 1930, and up to the middle of June, 1931, showed no indication of abatement. The hatch of young ducks in the Prairie Provinces of Canada in 1930 was only about half that of normal years. In this great area are bred the major part of the most commonly hunted wild ducks found in the United States during the fall and winter months. The Biological Survey has conducted continuous observations in the drought-stricken areas and has cooperated with Canadian authorities in an effort to obtain reliable information regarding critical conditions during the spring and summer, so that necessary safeguards for the wild fowl may be maintained.

Changes in Waterfowl-Season Regulations

After consulting the advisory board under the migratory-bird treaty act, the Biological Survey recommended regulations, and these were approved, to reduce the 1931–32 season on ducks and geese by two weeks throughout the United States. To accomplish the greatest possible saving of these birds the time was taken from the beginning of the season in the Northern States and from the end in the South. In 1930 the daily bag limit on ducks had been reduced to 15 and that on geese to 4. Other amendments to the regulations restrict to 10 the number of live-goose decoys that may be used at a gunning stand and make it illegal to shoot mourning doves over baited fields. Drought conditions over three years on waterfowl-breeding areas made limitation of the annual kill imperative, and on August 25, after the close of the fiscal year, continuation of acute waterfowl conditions made it necessary to reduce the open season throughout the country to one month.

Economic Importance of the Wild-Fowl Resources

The value of game birds becomes increasingly apparent; not only are they of great recreational value, but they also constitute an important game-food supply, and the upland game birds assist agriculture by

destroying weed seeds and insects. Many thousands of families have had living conditions made more agreeable by a game-food supply or by income derived from hunting and providing for the needs and entertainment of hunters. In one State alone during the open season of 1930 more than 2,350,000 wild ducks were killed. The total annual kill of wild ducks throughout North America in recent years has probably been between 10,000,000 and 15,000,000.

The Federal wild-fowl conservation policy has been set forth in the terms of the migratory-bird treaty act, which was passed to protect these birds through regulating the annual kill, and of the migratory-bird conservation act, a measure enacted to insure the permanent establishment of from 60 to 100 great national wild-fowl sanctuaries. The department, through research to eliminate losses from disease, by careful regulation of the annual kill to prevent waste and exploitation, and by the development of a refuge system, is endeavoring to maintain the abundance of migratory birds.

Migratory-Bird Refuges

During the first two years of the 10-year national program for the establishment of refuges for migratory game birds, approximately 4,000,000 acres in some 200 units have been studied to ascertain the nature of the wild-fowl food resources; land-valuation surveys looking toward purchases were made on 115 of these units, involving more than 3,000,000 acres in 41 States. The Migratory Bird Conservation Commission has approved the acquisition by purchase or lease of 111,517 acres at an average cost of $3.87 an acre, in California, Colorado, Florida, Nebraska, North Carolina, and South Carolina. By Executive order four refuge areas have been reserved from the public domain in Montana, Oklahoma, Nevada, and California. Added to the lands approved for purchase, these areas bring the total acquisition under this program to 176,244 acres—representing nine migratory-bird refuges.

Musk Oxen Reintroduced into Alaska

In the summer of 1930, 34 musk oxen were obtained by the Biological Survey through a dealer who captured them in northeastern Greenland. After their sea voyage to New York, by way of Norway, they were held in quarantine a little more than a month as a precaution against the introduction of diseases that might be inimical to other species, wild or domestic. They were then taken by rail to Seattle, Wash., by steamer to Seward, Alaska, and again by rail to the bureau's reindeer experiment station near Fairbanks. Musk oxen formerly occurred in Alaska but disappeared previous to the occupation of their range by Europeans.

Control of Injurious Wild Animals

In the interests of all branches of agriculture, forestry, and game protection the Bureau of Biological Survey has cooperated for more than 15 years with State and other organizations in work for the control of predatory wild animals and injurious rodents. A special program of control drawn up by the department to cover a 10-year period and authorized by Congress during the year will make more effective the work as already organized. It will also enable the Bio-

logical Survey more adequately to conduct and supervise control operations. The leadership of the department in this work has been requested and encouraged by State and other agencies, and the funds made available from such sources for expenditure under the direction of the Biological Survey have been far in excess of those provided for the purpose from the National Treasury.

HOME ECONOMICS

The work of the Bureau of Home Economics during the past year was adjusted so far as possible to meet the needs of homes with incomes reduced by the drought and unemployment. Advice and assistance to home makers were furnished through correspondence, radio broadcasting, press releases, and printed bulletins. These efforts were designed to serve household needs, to improve standards of living, and to promote wise use of agricultural products in the home. The program included special studies in low-cost diets, the preparation of food guides for use of extension workers and others in the drought areas, and the dissemination of facts as to cheap sources of "protective foods," especially those containing the factors that prevent pellagra. Thousands of charts and leaflets were distributed for this purpose. In response to a call from the women's division of the President's Emergency Committee for Employment, similar service was extended to families with incomes reduced by unemployment. Recipes for low-cost diets were worked out and distributed.

In cooperation with other institutions the bureau studied the selection of food for children. A report has been prepared indicating the part the nursery school can play in providing adequate meals for children from 2 to 6. Another publication, Food for Children, based on an experiment in child feeding at the Washington Child Research Center, has been issued.

The bureau participated in the work of the White House Conference on Child Health and Protection. It is represented on the planning committee of the President's Conference on Home Building and Home Ownership, which is collecting data that should be of great value in bettering housing and home-living conditions.

Study of Consumer Needs

Dietary surveys of different population groups are in progress. The records, showing consumption trends, are checked against nutritive needs to guide both production and consumer demand. Other investigations deal with the quality of agricultural products. Tests of the palatability of meat as affected by different production factors and by different methods of cutting, handling, or cooking are conducted in cooperation with the Bureau of Animal Industry and the Bureau of Agricultural Economics. The meat used is produced at State agricultural experiment stations. The effect of breeding, fertilization, and storage upon the cooking quality of potatoes is tested in cooperative studies with the Bureau of Plant Industry and the Bureau of Chemistry and Soils. Comparative cooking tests on eight native-grown varieties of rice have shown different lengths of time for satisfactory cooking, thereby lending support to the contention that varieties should not be mixed for marketing.

Studies of Fabrics

Studies of fabrics deal with the wearing qualities of household materials manufactured from different grades of cotton and wool. Sheets and blankets manufactured from different grades of these materials are tested under controlled conditions of constant use.

Textile-utilization experiments were continued to determine new and more satisfactory uses for fibers grown in this country. The results were made available in popular publications. A farmers' bulletin on window curtaining, a leaflet on slip covers, and another on furnishing living rooms were prepared to encourage a wider use of cotton materials, as well as to help farm families in improving their homes.

Basic Research

Investigations were continued regarding the standard of living of families on marginal farms in the Appalachian highlands. Information thus obtained was correlated with facts regarding the size and sources of family incomes, the types of soil farmed, the uses made of land, and the character of the schools and other community facilities. Preliminary reports were presented at a conference with the extension service of the University of Kentucky, and at a meeting of the Kentucky Home Economics Association. A second survey was begun in June in Grayson County, Va., an Appalachian community of a somewhat different type.

A study of the food supply of 73 families on marginal farms in South Carolina, where pellagra is prevalent, compared the food habits of families that had escaped the disease with the food habits of families that had not escaped it. It also included comparisons with families of similar economic status and similar diet in mountain regions of Kentucky. The study showed the beneficial effects of adding different amounts of certain pellagra-preventive materials to the diet.

The use of wheat germ and rice polish is recommended in communities where the diet commonly lacks vitamins B and G. These products, however, tend to grow rancid under the usual conditions of storage, and their use is consequently limited. Accordingly a method was sought whereby the home maker might retard the tendency. It was found that wheat germ and rice polish may be preserved by heating them for 9 or 10 minutes in a ¾-inch layer at 190° C. Formulae were worked out for enriching corn meal with dried skim milk or a combination of dried skim milk and wheat germ or rice polish. Wheat germ is as rich in vitamin B (the antineuritic vitamin) as yeast, and one-half to one-third as rich in the antipellagra vitamin G. Cottonseed flour, slightly less rich in both vitamins, would afford ample amounts of the pellagra-preventive factor for most diets, if used in the quantities found desirable for baked products.

Experiments with meat held at different temperatures showed that the development of bacteria advances markedly at temperature above 50° F., and that meat should be kept at the same low temperature as that recommended for milk (45° or below).

FOOD AND DRUG ADMINISTRATION

The Food and Drug Administration, a separate bureau of the department, is charged with the duty of enforcing the food and drugs act, the insecticide act, the tea act, the naval-stores act, the import-milk act, and the caustic-poison act.

The independent-bureau status of the Food and Drug Administration is emphasized here because a mistaken idea prevails in some quarters that analytical work incident to the enforcement of these various laws is performed by another bureau of the department, administrative details alone being centered in the Food and Drug Administration. A natural inference from such a misunderstanding would be that the regulatory operations are subject to divided control, a situation which obviously would be conducive to bad administration.

June 30, 1931, marked the twenty-fifth anniversary of the passage of the food and drugs act. Since the measure was passed, revolutionary changes in the food habits of Americans have taken place. Manufactured foods have become a stable and highly important item in the diet of those who live on the farm, as well as of those who dwell in cities. The progressively increasing demand for commercially prepared foods has effected marked changes in manufacturing methods and brought into the field large numbers of new manufacturers. This, and an increasing expansion in the drug and medicine manufacturing trades, have thrown a heavy burden on the Food and Drug Administration. Necessarily limited in personnel and working funds, the administration has concentrated on types of violations which endanger the public health and constitute serious economic frauds upon the consumer. While various attempts to weaken the act have been unsuccessful, and while in general the broad terms of the measure have been remarkably effective, the experiences of the last 25 years have clearly shown that the measure in its present form does not insure all the safeguards to the American consumer that its framers presumably intended. Consequently the department expects to recommend desirable amendments to the act.

Prosecutions and Seizures

In the course of import and interstate operations under the food and drugs act during the fiscal year ended June 30, 1931, the administration collected and examined 31,859 samples of foods and drugs. Prosecutions and seizures under the law numbered 991 in the case of foods, 885 in the case of drugs, and 101 in the case of livestock feeds, totaling 1,977 actions. Import inspections resulted in the passing of 4,899 shipments of food and 1,842 of drugs, while 2,469 shipments of food and 1,321 of drugs were detained. Since the passage of the law more than 18,000 legal actions have been instituted, involving both the seizure of offending goods and the prosecution of shippers.

McNary-Mapes Amendment

New tasks were imposed upon the technical forces of the administration by the passage on July 8, 1930, of the McNary-Mapes amendment to the pure food law. Since no special appropriation was made for carrying on work under the amendment, many technical investi-

gations of the administration were temporarily forced into the background following the passage of the measure. The formulation of standards of quality and of condition and fill of container is necessitated by the amendment. Six important classes of canned foods were chosen for preliminary work. These were peas, peaches, pears, apricots, cherries, and tomatoes, for all of which standards were promulgated during the year. The designation "Below U. S. Standard. Low Quality, but not Illegal" was adopted for use in labeling substandard products.

Corn Sugar Under the Food and Drugs Act

On December 26, 1930, a decision defining the status of corn sugar (dextrose) under the law was announced in the following terms:

> Corn sugar (dextrose) when sold in packages must be labeled as such; when sold in bulk must be declared as such; but the use of pure refined corn sugar as an ingredient in the packing, preparation, or processing of any article of food in which sugar is a recognized element need not be declared upon the label of any such product.
>
> Nothing in this ruling shall be construed to permit the adulteration or imitation of any natural product, such as honey, by the addition of any sugar or other ingredient whatever.

In order to bring the existing definitions and standards for food products into conformity with this decision, the definitions and standards as previously published were revised.

Offenses Involving Public Health

Foods may become dangerous through contamination with poisons, through the development of certain forms of bacteriological decomposition, or through the presence of disease germs. To-day, such contamination is rare in commercially packed foods. The increasing efficiency of commercial food-manufacturing methods in the United States is illustrated by the fact that in the last two fiscal years the administration has encountered no cases of botulism attributable to commercially packed food.

The canning of prunes, an expanding industry in the Pacific Northwest, necessitated some control by Government agents. The 1930 pack, 660,000 cases, was considerably smaller than that of 1929, due to unfavorable weather. The harvest season for prunes in the Pacific Northwest generally comes in September, and at that time last year continued rains and cloudy weather were responsible for the rapid development of brown rot which infected approximately 40 per cent of the crop and caused heavy losses to the industry. The heavy infestation required immediate regulatory action. Officials collected 49 official and 108 investigational samples for examination. This resulted in 20 seizures, involving about 4,500 cases of canned prunes.

A significant legal action concluded during the year involved the interstate shipment of approximately 43,000 cases of canned salmon, found to be partly decomposed. Following seizures of the goods, criminal prosecution was instituted, and the Federal judge of Seattle, Wash., imposed fines of $350 and $300 upon the two offending shippers, at the same time expressing regret that the limitations of the statute prevented the imposition of jail sentences.

Actions Involving Drugs

The Food and Drug Administration tries to protect the public against patent medicines bearing curative claims far in excess of their actual merit. Fraudulent claims made regarding the curative value of an illegal remedy have always been regarded by the department as a definite public menace. During the past fiscal year 570 seizures of falsely and fraudulently labeled proprietary medicines were made.

During the calendar year 1930, 6,189 cans of anesthetic ether were examined. Of these, 313 were found not of United States Pharmacopoeia quality; 82 lots were libeled. A 5-year campaign against impure or low-quality anesthetic ether has resulted in a marked improvement in the quality of this important product. Of 470 cans examined in 1926, 162, or 34 per cent, were found to be low in quality and unfit for anesthetic purposes. Only 5 per cent of the cans examined in 1930 were found to fall in that class.

Worthless Veterinary Preparations

Progress has been made in the department's efforts to protect the farmer against ineffective veterinary remedies. Interstate commerce has now been cleared of preparations falsely and fraudulently labeled as having therapeutic value in contagious abortion of cattle, hog cholera, and tuberculosis of livestock. Careful surveillance was maintained over proprietary veterinary preparations labeled as having therapeutic value for other diseases of farm livestock and poultry. Internal parasites are of considerable economic importance to the farmer in that they cut down the producing ability and thus the value of his animals. Critical tests of a number of vermifuges were made. An important case, involving a group of veterinary preparations falsely represented as treatments for black tongue, distemper, and running fits of dogs, was concluded at New Orleans when the Government secured a verdict in a contested action.

Other Regulatory Activities

Nearly 1,500 insecticides and fungicides were examined and, when necessary, submitted to field tests. Thirty cases, representing apparent violations of the law, were reported to the Department of Justice for criminal or seizure proceedings. Disposition of 447 cases involving misbranded insecticides and fungicides was made. When the mislabeling was called to the attention of the manufacturers, they voluntarily made the necessary changes, making it unnecessary for the Government to resort to legal action. Many new combinations in insecticides and fungicides appeared upon the market during the year, requiring considerable laboratory analysis and testing.

A country-wide survey, begun in 1928, of products subject to the caustic poison act was completed. At the close of the fiscal year 1931, 70 per cent of the many thousands of labels encountered were in exact compliance with the requirements of the law. During the year 1 seizure under the act was instituted, and 16 additional cases are in the course of development.

Under the service features of the naval stores act the department's classifiers graded 181,429 barrels of rosin. The collections for this service work, which were turned over to the United States Treasury

as miscellaneous receipts, amounted to $13,913.62. Two prosecutions covering definitely willful violation of the naval stores act were terminated successfully.

The quantity of tea offered for importation during the fiscal year 1931 was 87,091,330 pounds, an increase of about 2,500,000 pounds over the total importations for the fiscal year 1930. Slightly over 49,000 pounds were rejected, this being only 0.057 per cent of the total quantity offered for entry.

Enforcement of the import milk act is centered at Rouses Point, N. Y., in the heart of the section through which most of the milk from Canada enters the country. As a result of farm and plant inspection work provided for under the act a change for the better has taken place in the sanitary condition of dairy farms, and in plant practices. This improvement was reflected in importations of milk and cream of a uniformly high quality. Many of the plants under supervision have installed a definite farm-inspection and milk-testing system as a routine practice. During the fiscal year 1931, 170 plants and 1,756 dairy farms were inspected. Products from 143 dairy farms were embargoed, and 50 foreign farms were released from previous embargoes. One hundred twenty-five permits to import were renewed.

TRADING IN GRAIN FUTURES

Trading in wheat futures in the United States showed a sharp decrease as compared with such activity during the previous fiscal year. The total volume of trading on all exchanges designated contract markets under the grain futures act of 1922 amounted to 10,063,139,000 bushels during the year ended June 30, 1931. While this is nearly 50 per cent less than the volume for the previous year, when total sales aggregated 19,606,790,000 bushels, it nevertheless exceeds the low record in 1923–24 by about 38 per cent.

Decreased activity in wheat futures was due in part to the shifting of speculative interest to corn, where a short crop and a closer adjustment between supply and demand furnished greater incentive to speculation. This was reflected in a 50 per cent increase in the volume of trade in corn futures over that of the previous year. Trading in corn futures during the fiscal year ended June 30, 1931, amounted to 5,505,123,000 bushels, as against 3,667,885,000 in 1929–30. The last-named figure, however, was the smallest of record and showed about half as much trading as was done in 1924–25 and in 1927–28.

Some of the decline in trading in wheat futures resulted from the stabilization activities of the Federal Farm Board, in that speculation was naturally reduced in the December, March, and May futures, which were supported by the Grain Stabilization Corporation. Not all of the decline, however, can be attributed to that cause. The unusually large stocks of wheat, a limited foreign demand accompanied by declining prices, and the unsettled condition of the stock market and business generally throughout the world had a marked effect in minimizing speculative interest of all kinds. In this connection, it may be noted that while trading in all grain futures combined during the year ended June 30, 1931, was 17,034,201,000 bushels as against 24,999,650,000 the previous year, a decrease of about 32 per cent, the decrease in the trading in securities on the New York Stock

change during the same period was even greater. The number of shares sold from July 1, 1930, to June 30, 1931, amounted to about 667,000,000 as compared with 1,080,000,000 the previous year, or a decrease of about 38 per cent.

Though the volume of trading in wheat futures during 1930–31 was relatively small, the amount of open contracts reported to the Grain Futures Administration by members of contract markets was large. This contrast is largely explained by the heavy stocks that were carried forward and hedged. It appears that the hedges were absorbed and carried mainly by the so-called general public and by the Grain Stabilization Corporation, which bought large quantities of wheat in the futures markets and took delivery. The general public composed of small traders is usually found on the buying side. It was on the buying side last year, when prices were declining. On the other hand, the so-called large professional traders operated primarily on the short side. This may have reflected superior judgment on their part, but it certainly added to the load on the bear side of the market. Hedgers, however, had a fair measure of protection during the year owing to the prevailing favorable relationships between cash-grain prices and prices in the futures markets.

Stabilization Operations

Special interest attaches to the results of stabilization operations conducted by the Federal Farm Board between November 15, 1930, the date when stabilization was authorized, and May 30, 1931, when the May future expired. These operations related to the 1930 wheat crop, and established the basis upon which most of that crop was sold. Prior to November 15, Chicago July wheat had sold slightly above the May wheat, but prices had steadily declined since the second week in August. The July future at Chicago continued to decline. It sold below 60 cents in March and again in April and May, 1931. The May price, on the other hand, was stabilized by the Federal Farm Board at above 80 cents throughout most of this period. After stabilization was discontinued the price of the July future declined to lower levels, and on the last day of July sold under 50 cents. Chicago May wheat during January, February, March, April, and May was above the Liverpool price by from 15 to 20 cents a bushel. Normally, when the United States has an exportable surplus of wheat, the Chicago price is below the Liverpool price. Besides being held at a higher level during the stabilization period, the May future was kept within a very narrow range of fluctuation. The average daily range from November 15 to May 30 in the May future was only half a cent a bushel, whereas in the July future the average daily range was 1⅜ cents. In the dominant futures from May 1, 1930, to November 15, 1930—that is to say, in the five and one-half months preceding the board's stabilization operations—the average daily range was 2⅛ cents. It is thus obvious that much of the 1930 wheat crop brought prices considerably higher than the prices that would have ruled had the Federal Farm Board not entered the market.

Action Needed to Correct Abuses

Grain exchanges and grain-futures markets play an important part in our marketing system. The hedging facilities which are offered mill-

ers and dealers generally serve useful purposes, and, on the whole, these markets function efficiently. Action is required, however, to eliminate certain abuses. I referred to this matter in my annual report last year and wish to reaffirm here what I then said. Legislation to strengthen the present grain futures act seems desirable, to eliminate sharp practices in the handling of customers' orders, and to afford a safe and sure means of control over the purely speculative trading of large operators. Under existing conditions the unrestricted opportunity to buy or sell futures enables large traders at times to take advantage of technical situations to the disadvantage, not only of producers and cash handlers of grain, but of the small traders composing the general trading public. Small traders are necessary to maintain a liquid futures market. They should be guaranteed fair play and a fair chance against those with larger means. This is said not to encourage speculation but to emphasize the necessity of making the future-trading system equitable. It should extend equal opportunity to all traders so that its benefits may flow as directly as possible to the producers of grain and the handlers of actual grain and grain products. Existing legislation does not give the Federal Government authority to limit excessively large speculative lines or to limit short selling calculated to demoralize prices.

EXTENSION SERVICE

Supplementing sources of farm income and maintaining as good a standard of living on the farm as possible with the income in hand were the chief problems to which extension workers gave attention this year. Price-breaking surpluses of wheat and cotton necessitated large production adjustments. The development of new sources of income became imperative. Supplemental lines of production had to be considered and adopted. County extension agents were constantly busy studying the situations in which producers found themselves individually and collectively. Reliable and practical information from State agricultural colleges and the department was in pressing demand. Consulting with farmers as to their operations is not a new activity of extension agents. Crop adjustments have been made with the aid of extension workers in many counties and in entire States. It is a recent development, however, for the entire force of the cooperative extension service to direct its attention largely to problems of agricultural adjustment the country over. Extension problems this year were more numerous, more complex, and more widespread than ever before.

The California Extension Service reported striking results from a 10-year campaign to put dairying on a sound and profitable basis. Production was so increased in volume and efficiency that California's dairy industry in 1930 had a gross income $25,000,000 greater than that of 1920. The campaign was undertaken following a thorough study of the industry's requirements, prominent among which was greater stability. The objectives were outlined, and the work was conducted steadily to a successful issue.

Extension workers this year helped producers throughout the country to map out programs. Where it seemed advisable to curtail or abandon a line of production, substitute crops or enterprises were considered. Many farmers were encouraged to develop new activities.

They undertook in increased numbers to grow home and farm supplies as much as possible and to build up reserves of feed, seed, and livestock. North Carolina produced $20,000,000 worth of food and feed more than in 1930. This is an outstanding example of the advantages obtained. The farm women and girls of that State are credited with putting up 2,250,000 quarts of home-grown fruits and vegetables in the past season.

Soil-Improvement Systems Adopted

In many districts definite systems of soil improvement were adopted, wood-lot and forest-area developments were started, and minor cash enterprises were launched to make up deficiencies in the income from major crops. Closer attention was given to the grading, pooling, and selling of marketable crops. Existing cooperative-marketing associations were strengthened and new ones organized. The establishment of credits on a sound basis was promoted and the use of credit encouraged where adequate returns could be expected. In this last effort local banking institutions and bankers' associations cooperated.

The department and the State agricultural colleges speeded the assembling of economic facts applying to local conditions. At a series of four regional conferences, State and Federal extension workers and economists considered available data. State workers returned to their own fields better equipped to aid in appraising local situations. At local conferences producers were helped to plan their individual farm programs. To strengthen this work 120 economic workers were added to the extension forces.

Home demonstration agents assisted farm women and girls in preparing and selling surplus garden, poultry, and dairy products. The development of home industries progressed. More than 200 operators of roadside markets attended a conference held in New Hampshire at the instance of the State extension service. The West Virginia Extension Service began the promotion of attractive tourist homes and supplemental home industries as sources of income to farm families. Farm women and girls were helped also in the economical buying of supplies, in the preservation of home-grown foods, in the making and remodeling of garments, in the refinishing of furniture, in the making of inexpensive improvements in the house, and in the planting and care of flowers and shrubbery. No other phase of home-demonstration work met with more appreciation than that resulting in the beautifying of the home and its surroundings.

Boys and girls joined in the general effort to augment farm incomes and maintain farm living standards. More than 845,000 were enrolled in 4-H clubs, in which, under the supervision of extension agents, they studied and demonstrated efficient farming and home making. The growing of cotton, corn, potatoes, and other vegetables and the care of calves, pigs, and poultry gave them training in production and marketing. Their activities included preserving fruits and vegetables, cooking and serving meals, making and remodeling clothing, and furnishing and decorating rooms.

The field force employed in extension work on June 30, 1931, totaled 6,179 persons, an increase of 219 over the number last year. In the counties 2,382 county agents, 234 assistant agents, and 167 negro

agents were employed. The home economics staff included 1,241 county home demonstration agents, 36 assistant agents, 10 urban agents, and 123 negro agents. Two hundred and eighteen county club agents and 33 assistants devoted full time to 4-H clubs. Practically all county extension agents gave some time to boys' and girls' clubs. To reenforce the efforts of county extension agents and to assist in dealing with specialized problems there were 1,222 extension specialists stationed usually at the State agricultural colleges. The administrative and supervisory staff in the States numbered 495 persons.

Appropriations for Extension Work

Federal appropriations amounting to $6,192,936 were allotted to the 48 States and the Territories of Hawaii and Alaska for extension work under the terms of the Smith-Lever Appropriation Acts and $1,480,000 was allotted under the terms of the Capper-Ketcham Act. A special appropriation of $1,000,000 for allotment to the States was made available by the Congress, primarily for extension work in economics and marketing. The direct Federal appropriation for extension work was $1,755,000, of which $1,550,000 was for farmers' cooperative demonstration work and motion pictures, $15,000 for general administrative expenses, $120,000 for exhibits, and $70,000 for farm-forestry extension. The States, counties, and other agencies contributed $15,876,250 for cooperative extension work. The total of all these items available for cooperative extension work with the State agricultural colleges and for motion pictures and exhibits was $26,304,186.

INFORMATIONAL WORK

When times are hard for the farmer, technical and economic information that he can put to practical use becomes all the more necessary. The department, consequently, increased its efforts this year to give the public information developed by its research, service, and regulatory activities.

Increased funds, made available by Congress for printing and binding, permitted increased publishing. Manuscripts sent to the printer totaled 1,737, as compared with 1,702 in the previous fiscal year. The number included several emergency publications necessitated by drought and unemployment relief work. Publications are the permanent foundation of the department's informational work. For years there has been considerable delay between the completion of a research project and the publication of the results; now this gap is being narrowed. In the act creating the Department of Agriculture, Congress made the dissemination of knowledge by the department as important a duty as the acquisition of knowledge. Evidence of the extent to which this function is being discharged is furnished by the demand for the department's publications, which are not foisted upon persons who do not desire them, but are mailed only on request. Hence, the fact that nearly 32,000,000 copies of various classes of publications were distributed in the last fiscal year indicates that the publication program is adapted to its purpose. Approximately 12,500,000 of the publications distributed were farmers' bulletins, and 2,058,538 were leaflets. About 17,000,000 copies of technical, semitechnical, periodical, and miscellaneous publications were issued.

Press Aids Department

It would be difficult to overvalue the help of the press in disseminating agricultural information, particularly in times of economic disturbance, when speedy communication is essential. All scientific facts should be made known quickly. Economic information especially demands almost instantaneous distribution. The press furnishes valuable aid in doing this. Press cooperation is particularly valuable in disseminating data about crops and markets. The press also devotes much space to results gained by the department in production studies, in the control of animal and plant pests, in chemical research, in meteorology, in forestry studies, in wild-life conservation, and in home economics. Though most publications have been forced by the depression to reduce their size, releases issued by the department seem to have been used about as fully and widely as formerly. It is generally recognized by the press, both daily and periodical, that the material issued by the department has practical value. This is shown by a growing demand, not only for press releases, but for articles by the department's specialists. Press associations and syndicates carry such articles regularly.

The Radio Service

Important advances continued during the year in the department's radio work, further enhancing the valuable service rendered agriculture by this new medium of communication. Radio broadcasting makes available to the farmers much economic and technical information that might otherwise not reach them or might reach them too late to be of full value.

A new network program, originating on the Pacific coast and broadcast in the Pacific and intermountain regions by 8 stations associated with the National Broadcasting Co., was started. In the last two years the department's broadcasting has grown tremendously. In the early part of 1929, it issued one network program through 17 radio stations. It is now issuing two daily programs and one weekly network program through 55 radio stations. Two years ago it put out syndicate programs through 164 stations. Similar manuscript programs now go to the audiences of 234 stations.

Land-grant colleges are cooperating with the department in extension broadcasting, and in surveying broadcasting requirements and possibilities. The projected Federal-State extension program envisages daily 15-minute syndicate programs broadcast through more than 250 cooperating commercial stations. One-third of the land-grant colleges themselves operate radio stations.

It was found desirable in broadcasting to continue emphasizing economic information. The national farm and home hour, the western farm and home hour, and department programs on more than half the individual stations in the United States proved effective means of sending rush information to farm people throughout the country. Better cooperation between agricultural program makers and the nation's broadcasters is desirable. Better correlation between Federal and State subject matter is also necessary. Both these ends are being sought.

WEATHER BUREAU

Diminished precipitation last year and again this year over large areas was reflected in river stages which in the main were low. This circumstance enabled the Weather Bureau to repair its river gauges and verify zero points. It afforded an opportunity also to strengthen the river-stage service in other respects. Some additional river-stage stations were established. Recent engineering developments, including the building of fine roads and bridges, the development of water resources, and flood-protection work necessitate a more exact study of river stages and a more adequate flood-forecast service. The measurement of low-water stages, which formerly was relatively unimportant, now must be done with extreme care. The Weather Bureau took advantage of the exceptional conditions prevailing this year to improve its facilities for making these measurements. Important advantages are expected, particularly to river navigation, which depends mainly on the Weather Bureau for information about river stages and ice movements.

Extensions were made by the Weather Bureau during the year in its daily weather service, principally in the facilities for obtaining observations from ships in the North Atlantic, the South Atlantic, the Caribbean Sea, and the Gulf of Mexico. In accordance with international agreements, more reports were received from ships of foreign registry. Daily radio bulletins containing ship reports and observations from representative land stations in Europe and Asia were received. This information was particularly welcome because weather reports from overseas previously had not been received regularly. Such reports are now collected at the British Meteorological Office and transmitted to the United States Weather Bureau through radio stations at Rugby and Bar Harbor. Arrangements were made also for getting additional information on barometric changes, on the time and character of precipitation, and on humidity conditions in the United States and Canada.

To meet increasing demands for special forecasts for agriculture, aviation, and other interests, the Weather Bureau, with funds specially provided by Congress, began training forecasters. Candidates selected from members of the Weather Bureau were taught how to prepare maps and interpret weather reports. They received special instruction in meteorology, physics, and mathematics. After preliminary training in Washington, the class was distributed among field stations.

Service for Air Navigation

Following the passage of the air commerce act in 1926, the annual appropriations of the bureau have provided for notable extensions of its meteorological service in aid of air navigation.

At the close of the fiscal year June 30, 1931, approximately 9,400 miles of airways were provided with continuous, 24-hour service. This represented an increase for the year of about 3,400 miles. In addition, partial service (reports collected only for scheduled flights) was organized for about 3,000 miles of new airways, making a total of about 6,000 miles partially served, or a grand total of about 15,500 miles.

Along with the development of this network of frequent current reports, a system of airways forecasts every three hours was organized

with an extension during the year to three additional centers, Atlanta, Dallas, and Portland. With those previously organized at Cleveland, Oakland, Omaha, and Salt Lake City the country is well covered, except in the northern and southern Plains States and the extreme Northeast and Southeast.

Airways service in Alaska was extended by the establishment of a station at Nome with facilities for making pilot-balloon observations. Airways stations were established also at a number of other points. These stations report on schedule for plane movements by radio, telephone, or telegraph. A number of airways stations were established in the Hawaiian Islands to make reports for interisland flying.

Ten additional pilot-balloon stations were established during the year. One was established at Akron, Ohio, primarily to investigate the effect of wind gustiness on dirigibles.

AGRICULTURAL EXPERIMENT STATIONS

Through its Office of Experiment Stations the Department of Agriculture maintains close relations with the agricultural experiment stations of the several States and with those of Alaska, Hawaii, Porto Rico, Guam, and the Virgin Islands. It is cooperating with these stations in more than 1,000 research projects, or more than 15 per cent of the projects in which the stations are engaged. This cooperation economizes effort, coordinates different investigations, and prevents duplication of work.

The Federal Government contributes annually about $4,500,000 to the experiment stations, whose total funds are approximately $18,000,000 annually. Evidence of the value attached to these institutions is shown by the fact that their support from State and local appropriations and from donations and endowments has increased greatly in recent years. The money spent annually by the stations comes to about $3 per farm in the United States. It is impossible to measure the money return, but it is unquestionably large.

Research in which the department cooperates with the stations covers national, regional, and local problems. It has to do with the needs of the farm home and with rural-community matters as well as with the production, distribution, and sale of farm products. The results are disseminated by colleges and schools of agriculture, as well as in textbooks, treatises, and bulletins. Experiment station findings obtain wide publicity, also, through the rural press and the radio. They are translated into farm practice especially through the extension services of the different States.

Activities of Insular Stations

Special efforts were made during the last year, through the agricultural experiment stations of Alaska, Hawaii, Porto Rico, Guam, and the Virgin Islands, to improve agriculture and rural life conditions in these territories. The work was aided by certain important changes authorized by Congress and by local legislatures in the status of these stations. Under an act of Congress approved February 23, 1929, whereby the benefits of the Hatch Act were extended to Alaska, an experiment station was established in connection with the Alaska Agricultural College and School of Mines. A station operated by the department at Fairbanks, Alaska, since 1907 was merged with the

new organization. This change will extend the scope, effectiveness and application of the research and service work undertaken. It will also encourage local participation in the work.

In Hawaii a consolidation of experiment station work under the joint supervision of this department and the University of Hawaii, which was provided for by an act of Congress passed May 16, 1928, brought about increased efficiency and economy. This legislation, like that passed with reference to Alaska, extended the benefits of the Hatch Act and supplementary acts to Hawaii.

A similar measure approved March 4, 1931, extended the benefits of the Hatch and supplementary acts to Porto Rico. This measure provided for the coordination of experiment station work in the island in accordance with plans approved by the Secretary of Agriculture. The required coordination is under way. It will bring about joint action by the Federal authorities, the insular stations, and other agencies interested in improving the agriculture of the island.

Federal research workers cooperated during the year with the experiment station in the Virgin Islands in efforts to improve agricultural conditions there. Important benefits are expected from a soil survey of a portion of St. Croix which was completed by the Bureau of Chemistry and Soils. Studies were made to determine whether the bay-oil industry, in which the Virgin Islands formerly excelled, can be improved. Federal entomologists cooperated with authorities of the experiment station in a survey to ascertain whether the pink bollworm could be controlled and the cotton industry restored in the islands.

ARTHUR M. HYDE,
Secretary of Agriculture.

WHAT'S NEW IN AGRICULTURE

ALFALFA-STEM Nematode Causing Severe Damage in Some Western Areas

In recent years the alfalfa-stem nematode, *Tylenchus dipsaci*, has appeared in certain areas of the Western States. Its ability to injure the crop severely has been demonstrated in almost every instance, the amount of damage sometimes being one-half to three-fourths of the crop. The heavier losses occur on fields in which the alfalfa has been allowed to remain growing for five or more years, younger alfalfa growth seldom being severely infested unless planted immediately after an old infested crop was removed from the same field.

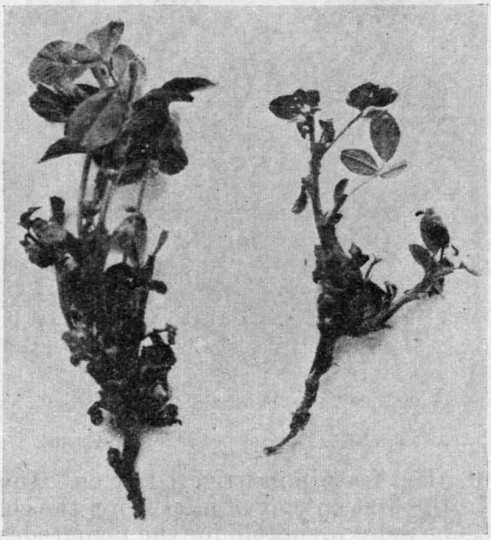

FIGURE 1.—Shoots from an infested plant showing the typical clubbed appearance

Description and Habits of the Stem Nematode

The organism causing the disease is an active, slender, nearly colorless, eellike worm averaging about one-twentieth of an inch in length. Its mouth bears a strong spearlike organ with which it punctures the plant tissues and makes an opening through which it enters. The opening is usually at the growing point of the shoot or at the leaf axils.

The nematodes pass the winter in a quiescent, inactive state in the small alfalfa produced in the fall and in the soil and rubbish about the crowns. With the advent of spring they attack the first young shoots of alfalfa as soon as they appear. Frequently the shoots are killed outright, but if they survive the attack they become thickened, clublike, and deformed. (Fig. 1.) As the season advances these stems will be found to have swollen, blackened bases which break off easily when pulled, and the interior will be found decayed. Such stems frequently die after growing a foot or two high. Occasionally colonies of nematodes become established a foot or more above the ground and cause swollen areas on the stems. (Fig. 2.)

Microscopic examination of an infested stem reveals thousands of nematodes in all stages of growth. Those that enter in the spring are usually, if not always, the preadult form, and after feeding for a few days they mature and mate, and egg production begins. The eggs hatch immediately, the young begin feeding, and the colony soon contains nematodes in all stages of growth. Several generations occur in a single season.

If the plant dies, most of the nematodes leave and migrate to surrounding plants if the soil is moist. Such migration is not possible through dry soil. For this reason, plants that once have been heavily infested may not contain nematodes if examined after they have died.

FIGURE 2.—Alfalfa plant infested with stem nematode

Appreciable injury the first year of infestation is uncommon unless unusually large numbers of nematodes are present, but in the second year the killing of the shoots and the subsequent decay of of the crown may weaken the the plant rapidly. However, it may survive for many years depending upon its vitality, the fertility of the soil, and the severity of the infestation.

Appearance of Infested Fields

Infestation usually first appears in small areas and is indicated by stunted or dying plants. The size of the damaged area increases year after year, especially in the direction of water flow. This is a marked feature in irrigated fields. Injury is usually most prominent in the first cutting of alfalfa, for the cool, moist spring months appear to be more favorable for the nematodes. Later in the season it may be difficult to find typically infested shoots.

Control

Crop rotation is the only known method of control under ordinary field conditions. Under a systematic crop rotation in which alfalfa is allowed to remain not over three or four years, there is less danger of serious loss. When an alfalfa field becomes infested to a point where serious loss occurs, it should be plowed up and planted with other crops for at least two or three years, care being taken to eliminate all alfalfa plants and weeds. Suitable crops for rotation include sugar beets, wheat, corn, barley, beans, and peas.

Fortunately the alfalfa-stem nematode, so far as known, does not adapt itself readily to other plants in this country, but in certain foreign localities it has been found to infest oats, potatoes, and clover seriously. Therefore, while the nematode may not attack these crops in

the Western States, it is advisable not to use them in a rotation on an infested alfalfa field if others in the list of suitable plants can be grown advantageously.

The most common means of transportation into a locality is infested seed that carries the nematodes in dirt and fragments of infested stems. To prevent introduction of the nematodes into clean fields only well-cleaned seed should be used. Seed that has passed through the cleaner two or three times is much less likely to carry nematodes.

Distribution from infested areas to neighboring fields occurs through the movement of hay, soil, machinery, and irrigating water. Therefore, when once an infestation is located, care should be exercised to avoid spread.

GERALD THORNE, *Bureau of Plant Industry.*

BEE-CULTURE Research Recently Inaugurated on the Pacific Coast In the spring of 1931, the Pacific Coast Bee Culture Field Station of the United States Bureau of Entomology was established in the new, fireproof Animal Science Building of the College of Agriculture, University of California, on the university farm at Davis, Calif.

At this station it is planned, not only to undertake problems in beekeeping which pertain to California, Oregon, Washington, Nevada, and Arizona, but also to include such other research of general importance to the industry as can best be studied on the Pacific coast.

FIGURE 3.—A 1,000-colony apiary which was moved into the Porterville, Calif., orange area for the orange honey flow; 25,000 colonies were moved into this area for a few weeks

An increasing demand for research in beekeeping has accompanied the changes in agriculture in the great honey-producing territory of the Pacific coast. New problems confronted the beekeeper as the ranches turned from the production of beef to wheat, then to alfalfa, and more recently to cotton and deciduous and citrus fruits, or to vegetables and seeds. Associations of beekeepers felt that Federal research was necessary, and the new station was established to meet this need.

The station is now attacking basic problems confronting the industry, thus laying foundations for detailed research. Studies of the economic aspects of the beekeeping industry and of the relationship between beekeeping and the production of fruit are being made. Conditions are being investigated to ascertain why beekeeping is carried on with profit in some Pacific coast districts and why it is not profitable in other districts. This necessitates a study not only of production and distribution of beekeeping products but also of beekeeping man-

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agement, of the distribution of nectar-secreting flora, and of weather and soil conditions, as all these factors have definite and important influences on the income which a beekeeper may derive from his business.

Relationship Between Beekeeping and Fruit Growing

Recognition of the important rôle played by the honeybee in production of crops of fine fruit has brought about increased use of bees for pollination. The relationship between beekeeping and fruit-growing is not yet clearly understood either by the beekeepers or by the fruit growers. The two activities should be of mutual benefit, but there are a number of problems, such as the use of poisonous insecticides and the belief in some quarters that the honeybee is one of the agents in the spread of fire blight, which for the time being complicate the issue.

Some important tasks of the station, therefore, will be to work out satisfactory practices for pollinating orchards in sections where heavy losses of bees from poisoning may be expected, and to determine exactly what part honeybees play in the dissemination of fire blight, as well as to prepare standards of strength and number of colonies.

With the establishment of the new station, the honey producers in the great beekeeping territory of the Pacific coast, who have been more or less isolated from direct contact with the research conducted by the Division of Bee Culture, have been given an opportunity to take up their problems directly and with little inconvenience.

E. L. Sechrist, *Bureau of Entomology.*

BEEF-CATTLE Finishing by Supplementing Pasture Is Increasing in Texas

Texas, with a colorful history as a beef-producing region, is now undergoing a rather noteworthy change in the tendency toward finishing cattle by supplementing pasturage with other feeds.

Preparing cattle for market other than with pasturage is comparatively new to Texas stockmen. There is little cattle-feeding tradition in the State, and this is particularly true of those regions which have been recently released from cattle-tick quarantine.

There must be recognized a distinction between farm feeding, which is a recent movement, and the feeding of cottonseed meal and cottonseed hulls at or near cottonseed-oil mills, a practice which has been carried on for many years. Meal and hull feeding is of a sporadic type, however, in that few of the same men feed meal and hulls every year. It usually happens that a cattle owner for one reason or another conceives the idea of sending some of his cattle to an oil-mill feed lot for fattening. These cattle are often the culls of the herd and as such may include old cows with calves, cull yearlings, and some old bulls. At times uniform herds of good-quality aged steers are thus placed on feed, but as a general rule the cattle fed on meal and hulls are of poor quality.

Surveys Show More Cattle Fed

The movement toward feeding cattle on the farms of the State is only about 3 years old. A recent survey report by county agents in 88 counties indicated that 507 feeders were finishing 70,088 head of cattle,

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of which 70 per cent were calves. A decided upward trend in the number of farmers who utilized home-grown feeds in finishing cattle during the feeding period of 1930–31 is shown in this report. A similar survey made the previous year showed feeding of cattle in only 50 counties, in which 211 feeders were finishing 40,000 head. Analysis of the 1929–30 report showed that more than half of the cattle were being fed by commercial feeders, mostly in the vicinity of Fort Worth, whereas the report for 1930–31 showed that three-fourths of the cattle were being fed by farmers and ranchmen.

A study involving 60 cattle feeders in the central Texas blackland belt showed that of the 8,540 cattle on feed 51.2 per cent were calves, 38.5 per cent were yearlings, and 10.3 per cent were older cattle, including cows and 2 to 4 year old steers. Most of the calves fed were of good quality. Approximately 50 per cent of these calves, however, were sent to market unfinished and as such were resold as stockers and feeders. Several factors contributed to this situation, one of which was lack of experience in feeding cattle for market. The financial results of the last two seasons of feeding have served to emphasize the necessity of low-cost gains.

Promising Feeding Systems

Feeding demonstrations involving the use of various roughages, grain sorghums, corn, and combinations of these feeds with cottonseed meal have resulted in well-finished cattle, when the cattle were fed a sufficient time. Two methods of producing marketable finished cattle in Texas give particular promise of being successful. One is feeding yearling cattle on sorghum silage and cottonseed meal. These cattle may receive grain, in addition to silage and cottonseed meal, if their quality justifies the additional expense. The other method is creep-feeding calves to be marketed either as fat slaughter calves or, with additional feeding in the dry lot, to be marketed with more weight and finish.

JOHN H. JONES, *Bureau of Animal Industry.*

BEEF Cattle, if Vigorous, Can Be Wintered on Range in Northern Great Plains

Stockmen in the northern Great Plains have long been confronted with the problems of economical feeds and of methods of wintering breeding cows. These have been subjects of research by the State experiment stations and the United States Department of Agriculture. Contributions have been made by these agencies concerning feed requirements and rations for feed-lot use, but information concerning wintering on the range is still very limited. The methods best adapted to any locality in this range country are largely controlled by severity of weather conditions, availability of grazing land, and the quantity of stored feed available.

The northern Great Plains comprise approximately 130,000,000 acres of land in central and eastern Montana, the western part of the Dakotas, and a small corner of northeastern Wyoming. This area is drained by the Missouri River and its tributaries. The soil of the region, with the exception of eroded badlands, is generally fertile. Rainfall is the limiting factor in range-grass and feed-crop production. The annual precipitation ranges from about 13.8 inches at Miles City, Mont., to 16.8 inches at Ardmore, S. Dak.

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The land types of the region consist of 54 per cent grazing land, 13 per cent grazing-forage land, 12 per cent farming-grazing land, 12 per cent farming land, 7 per cent national forest, and 2 per cent irrigated land. The total grazing land is approximately 74 per cent of the total acreage. Because of its location, climate, soil, and vegetation, this region is primarily adapted to grazing; most of the crops for winter feed must be derived from native vegetation or feed crops grown under semiarid conditions. Summer droughts, with subsequent shortages of water and range grass for winter and summer use, occur from time to time, as do severe winters with deep snow. This is a region, therefore, where feed and water reserves must be stored for periods of shortage.

Older Animals Winter Best

Stockmen in this region use various methods of wintering cows, the choice being influenced by the resources of the ranch involved. Any method that will carry a cow in such a way that she can be turned on to spring range in a strong vigorous condition at a minimum outlay of feed and expense is satisfactory. Calves and yearlings do not winter so well on the range as do older animals. Breeding cows and mature steers that carry good flesh can be economically wintered on the range, but they will suffer loss in weight which, however, is regained later on summer grass. Cows from which calves have been weaned in October, and that carry good flesh when winter weather arrives, can lose from 75 to 150 pounds during the winter and still produce normal calves. This is about the weight loss to be expected under average conditions where cows are wintered either on the range without supplement or in the feed lot with straw. These cows require more attention and closer observation than cows or steers carried with a fair amount of supplemental feed. The owner must be able to recognize symptoms of weakness and should promptly move weak animals to a hospital lot where more abundant and nutritious feed is available. Cattle wintering on the range require daily attention to prevent death losses. Falls into deep washouts are common, and injuries occur more frequently on the range than in the feed lot.

Natural Shelter Desirable

Wintering breeding cows and mature steers on the range involves a number of problems which must be given careful consideration if satisfactory results are to be obtained. In the first place, grazing land selected for winter range should be protected from grazing during the previous summer season. This land should contain rough hills and draws for bed grounds and natural protection during storms. An adequate supply of water should be available either from streams or from tanks kept free from ice. Because of snow on the range, grazing cattle do not require water so frequently in winter as in summer, but they must not lack water. Salt should be put out near the water supply to induce liberal use of water. Winter range should be close to a winter feed supply in order that weak cows may be removed to the feed lot with as little trailing as possible. The area of range per cow required for a 5-month period should average from 10 to 40 acres, the area depending on the density of the sod, the growth of grass, and snowfall during the winter. Rough, broken-up ranges generally supply more winter grazing during periods of deep snow than flat, exposed areas. Snowplows can be used very effectively to uncover grass on level regions during periods of deep snow.

Cottonseed Cake as a Range Supplement

Very satisfactory results have been obtained through the use of cottonseed cake fed, as a supplement, to cows on winter range. This supplement increases the winter cost, however, and its profitable use depends on the severity of the weather, condition of cattle, and quality of range forage. Nut-size cake, containing 43 per cent protein, is satisfactory where cattle are fed on the ground. A common and perhaps the most practical method of feeding the cake is to carry it to the range on a pack horse and feed cattle in small groups with as little movement of the cattle as possible. A measure of known capacity is valuable in obtaining an equal distribution of cake if the bunches of cattle are small. From 1 to 2 pounds of cake per head per day, or every other day, depending on the weather and condition of the cattle, is a common rate for feeding this concentrate. At the United States Range Livestock Experiment Station, Miles City, Mont., cows which were fed an average of 103 pounds of cake on the range during two mild winters (1929–30 and 1930–31) maintained their weight, whereas a similar group of cows on the range without cake lost an average of 27.9 pounds a head.

Range Wintering Results

The herd of Hereford breeding cows at the same station was carried on the range and in the feed lot through four winters, from 1925 to 1929. The objects were to determine (1) the percentage of cows in a breeding herd which, under average conditions, can be wintered on the range, (2) the effect of the loss in weight during the winter, as affecting subsequent gains on grass the following summer, and (3) the effect on the calf crop as shown by the number and weight at weaning time. This work was carried out along practical lines; strong cows were kept on the range all winter, and weak individuals were brought to the feed lot at different periods during the winter. Weak cows were kept in a hospital lot for a short period after removal from the range until they recuperated and then were placed with the regular feed-lot group, where straw and cottonseed cake were the principal feeds. A limited quantity of alfalfa hay was fed with straw during one winter and a heavy feed of corn silage during a second winter. Toward the close of one winter cottonseed cake was fed for 30 days on the range.

The range utilized during the winter was rough but well supplied with forage and with naturally protected bed grounds. It had been protected from grazing during the preceding summer season. The area, approximately 10,000 acres, greatly exceeded the grazing requirements of the cattle, as they trailed around constantly. Range forage consisted of western wheatgrass, grama grass, and needle grass. Water was pumped by windmills and stored in tanks, which were kept partly free from ice by the use of tank heaters.

Cows on the range all winter suffered an average loss in weight of 80.8 pounds, which was regained before the calves were weaned the next October. These cows were mature; only a small number were young or very old cows. This range-all-winter group comprised 53 per cent of the entire breeding herd through a 4-year period.

Cows on the range and in the feed lot suffered an average range-weight loss of 77.3 pounds. They gained 47.3 pounds in the feed lot and, therefore, suffered an average net loss of 30 pounds. This loss was also regained by the time the calves were weaned in October. The

range-and-feed-lot group comprised 47 per cent of the herd. During the winter this group was on the range 60 per cent of the time and in the feed lot 40 per cent of the time. The cows fed during the entire winter represented approximately 20 per cent of the entire herd.

The average weaning weight of the 408 calves produced through this 4-year study was 379.3 pounds. Calves produced by cows carried on the range all winter weighed 4.4 pounds more than this average, whereas calves produced by cows on the range and in the feed lot weighed 5.4 pounds less than the average.

Range Wintering Not Harmful to Breeding Cows

From 50 to 75 per cent of the cows in a breeding herd in good physical condition in the fall can be wintered on the range, under average weather conditions, when satisfactory range is available and good management practices are followed. Wintering on the range does not injure breeding cows and permits the accumulation of feed reserves for severe seasons. The conditions at the Miles City station with regard to climate and range are typical of the northern Great Plains, and results obtained in winter range work with breeding cows are generally applicable to northern Great Plains conditions.

A. L. Baker, *Bureau of Animal Industry.*

BEEF-COW Herd, When Properly Managed, Is Aid to Farm Income

The production of beef cattle is an enterprise that fits in well with a program of sound farm economy. This is especially true of a herd of beef cows which can be pastured to advantage during the spring and summer on land which is too rough for crop production or, for other reasons, is unsuited to that use. Later the cows will make effective use of such aftermath as stalk fields. Feeds of that class cost much less than hay and grain and save labor expense, particularly if the grazing areas are fenced.

Of course some labor will occasionally be needed, as for example, in making certain that water and salt are available to the herd, possibly in assisting at calving time, and in castrating when the calves are 3 or 4 months old. The practice of creep feeding the calves when they are on pasture with their dams will also periodically require a small amount of labor in filling the self-feeder. Although essential, these tasks are not heavy and need not involve the employment of extra farm helpers.

Winter Maintenance Cost Important

If the beef-cow herd is to increase the farm income materially, it is essential that cost of the winter maintenance be kept at a minimum. In fact, on most farms the winter season affords probably the greatest opportunity for feeding the herd in a manner that will insure low costs for the entire year. Excessive increase in weight is unnecessary and unprofitable. Nevertheless, it is important that the cows and bull have enough feed to maintain their condition and thrifty appearance throughout the winter months.

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Experimental results show that a winter gain had best not be over 50 to 75 pounds and that even a loss in weight of 25 to 40 pounds a head is not objectionable, provided the cows remain in thrifty condition.

A ration composed of silage, cottonseed meal or other protein concentrate, and straw will effectively maintain the herd at relatively low cost, but requires the purchase of the protein concentrate. However, a combination of corn silage, soybean hay, and wheat straw, all home-grown products, will be equally satisfactory. Shock corn, mixed hay, and straw may be used if silage is lacking, but these feeds are likely to prove less economical than those already mentioned.

The United States Department of Agriculture, in cooperation with the West Virginia Agricultural Experiment Station, has conducted experiments in wintering herds of cows in West Virginia. The results show a difference in the total cost of wintering a breeding herd of as much as one-third, between two of the rations fed, even when minimum quantities needed for maintenance were supplied. A careful consideration of feed combinations is extremely important if the herd is to be managed economically.

Creep-Fed Calves Develop Rapidly

To obtain such economy, maximum use of native and other pasturage in the spring, summer, and fall must be made. The calves may be creep-fed to advantage while on pasture with their dams, a practice which should increase the weight of each calf about 100 pounds by weaning time as well as develop a greater degree of finish by the time it is ready for market.

Beef cattle play a part in conserving soil fertility. Feeding home-raised grain, hay, and roughage helps to prevent the loss of fertility that would otherwise result from the removal of soil nutrients in the form of cash crops.

E. W. McComas, *Bureau of Animal Industry.*

BEEF Heifers Compare Favorably with Steers in Meat Experiments

As meat animals, heifers usually sell at a lower price per hundred pounds than do steers of similar grade and weight. The principal reasons advanced for this price discrimination concern relative finish or fatness, the claim that heifer carcasses tend to be excessively fat or wasty being widely made. This differential directly affects the producer when he disposes of young females not required for breeding purposes and, considering the large number of heifers marketed in the United States, it amounts to a very large sum of money each year.

Cooperative experiments for the study of this problem have been conducted recently as a part of the national project, cooperative meat investigations. The institutions participating in these experiments were the Arkansas Agricultural and Mechanical College; the agricultural experiment stations of Arkansas, Colorado, Michigan, Missouri, Mississippi, and Ohio; Sni-a-Bar Farms at Grain Valley, Mo.; and the Bureaus of Animal Industry, Agricultural Economics, and Home Economics of the United States Department of Agriculture.

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Fatness or Finish in Relation to Weight

In each of 12 experiments good beef-type steer and open (unbred) heifer calves of similar age, breeding, and previous feeding and management were fattened on like feeds and slaughtered at the same time after the same length of feeding period. The experiments included a total of 140 steers and 137 heifers. All were graded individually as feeders, as slaughter cattle, and as beef carcasses by committees of three men representing the State experiment station concerned and the department. Of the various characteristics of each individual so graded only three carcass characteristics are considered here. These are (1) amount of kidney and crotch fat, (2) thickness of external fat, and (3) amount of intermuscular fat. All are important indications of finish.

A carcass-grading chart adopted by the cooperators in the national project was used in the work. The chart provides for recognition of nine major degrees of finish, with three subdivisions of each. Table 1 gives descriptions of the different degrees of finish with the corresponding market grade indicated in each instance.

TABLE 1.—*Description of different degrees of finish with reference to kidney and crotch fat, external fat, and intermuscular fat of beef carcass*

[The corresponding market grade is shown in each instance]

Kidney and crotch fat	External fat	Intermuscular fat	Market grade of carcass
Extreme amount	Extremely thick	Extremely abundant	Good.
Unusual amount	Unusually thick	Unusually abundant	Choice.
Large amount	Very thick	Abundant	Prime.
Moderate amount	Thick	Moderately abundant	Choice.
Slightly deficient	Moderately thick	Slightly deficient	Good.
Moderately deficient	Slightly thin	Moderately deficient	Medium.
Deficient	Thin	Deficient	Common.
Very deficient	Very thin	Very deficient	Cutter.
Extremely deficient	Extremely thin	Extremely deficient	Low Cutter.

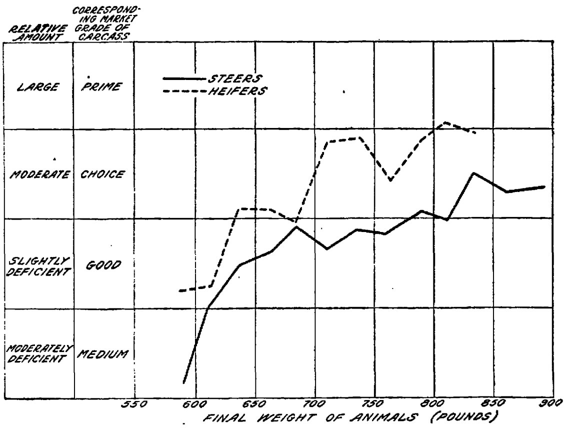

FIGURE 4.—Quantity of kidney and crotch fat in relation to final weight for well-bred steers and heifers

It will be noted in the classification that only seven market grades of carcass are represented, ranging from Prime down to Low Cutter. When the finish exceeded "very thick," with reference to external fat as an example, it was graded down to Choice or Good.

The relation between final feed-lot weight and amount of kidney and crotch fat is shown in Figure 4. In general, at all weights the heifers exceeded the steers in amount of kidney and crotch fat, a rather wide difference appearing between the sexes at a majority of the weights. It is of particular interest to note that the heifers reached a given degree of finish at a distinctly

lighter weight than the steers. For example, the heifers reached the degree of finish characterized by "moderate amount" of kidney and crotch fat at approximately 650 pounds weight, the steers at approximately 790 pounds. At about 800 pounds the heifers had reached the range represented by "large amount." No steers reached this degree of finish although some were fed to a weight of approximately 900 pounds.

As to the relation between final feed-lot weight and thickness of external fat (fig. 5) it appears that up to about 625 pounds weight there was very little difference between the sexes. At heavier weights, however, there was greater difference, with the heifers consistently showing the thicker fat. In external fat the heifers reached the degree of finish, "thick," at about 700 pounds weight, whereas the steers did not attain this finish until they weighed approximately 835 pounds. Neither sex in these experiments reached the degree of finish, "very thick," in external fat. A longer fattening period with greater gain would have been necessary to accomplish this.

Final feed-lot weight and amount of intermuscular fat (fig. 6) showed much the same trends and differences. The heifers and steers reached the degree of finish, "moderately abundant," at practically the same weights as those at which they had reached the corresponding degree of external fat, or at about 700 pounds and 835 pounds, respectively. Neither steers nor heifers acquired enough finish to be judged as having "abundant" intermuscular fat.

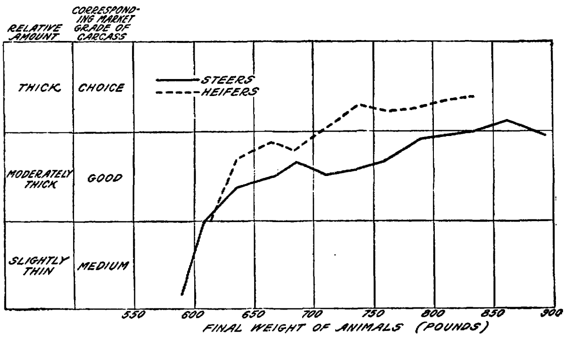

FIGURE 5.—Thickness of external fat in relation to final weight for well-bred steers and heifers

Dressing Percentages

The weight of the dressed carcass of a meat animal in relation to the live weight is always an important consideration. The relationship, or yield, is commonly expressed in terms of dressing percentage. With cattle, small differences in dressing percentage represent relatively large differences in pounds, due to the rather heavy weights commonly involved.

In these experiments 56 representative steers and 54 representative heifers were slaughtered under carefully controlled conditions and dressing percentages were determined. In 11 of the 12 experiments the representative heifers were lighter in weight at the close of the feeding period than the steers. The average difference for the 12 experiments was 76 pounds, the steers averaging 780 pounds in weight and the heifers 704 pounds.

In 7 of the 12 experiments the steers exceeded the heifers in dressing percentage. In the five other cases the heifers exceeded the steers. The average difference for the 12 experiments was so slight as to appear of

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no significance. In general the heifers dressed fully as high in percentage as the steers, although weighing an average of 76 pounds less than the steers at the end of the feeding period. At common final weights the heifers tended to yield a slightly higher percentage of carcass than the steers.

Palatability of the Cooked Meat

To the consumer the palatability of cooked meat is always of direct interest; to the producer, packer, and retailer it is also important, though less directly so. To compare the palatability of the meat of the sexes, standard rib cuts were taken from the same 56 steers and 54 heifers and roasted by a strictly uniform method. The department meat-judging committee, consisting of five persons, graded the cooked meat for tenderness, quality and quantity of juice, texture, intensity and desirability of aroma, flavor of lean, and flavor of fat.

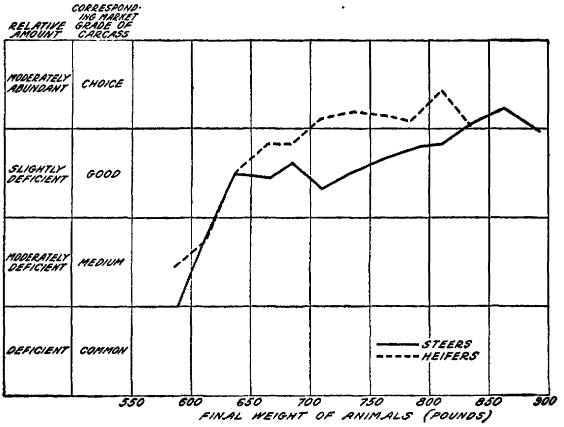

FIGURE 6.—Amount of intermuscular fat in relation to final weight for well-bred steers and heifers

The result showed no significant preference for the cooked meat of one sex over that of the other. The data justify no practical distinction between the sexes with respect to palatability of the meat.

In general the experiments suggest that if a moderate quantity of kidney and crotch fat and of intermuscular fat, together with a thick covering of external fat, is desired in the carcass the typical heifer should be slaughtered at about 725 pounds weight, the steer at about 850 pounds. The heifers tended to yield a slightly higher percentage of carcass than the steers at common final weights. No practical difference in palatability was shown. From these results it appears that up to the point where the heifer becomes excessively fat, price discrimination against her is not justified.

O. G. HANKINS, *Bureau of Animal Industry.*

BEET Leaf Hoppers' Origin Important in Control and in Prediction of Attack

The beet leaf hopper, *Eutettix tenellus* Baker, migrates long distances from its desert breeding grounds to the cultivated areas, where it transmits the disease commonly known as curly top to beets, tomatoes, beans, and other crops.

An effort has been made to determine which of the many breeding areas in the western part of the United States are responsible for infesting the various sugar-beet growing sections, particularly in Colorado, Utah, and Idaho. The general source of the bugs infesting the large

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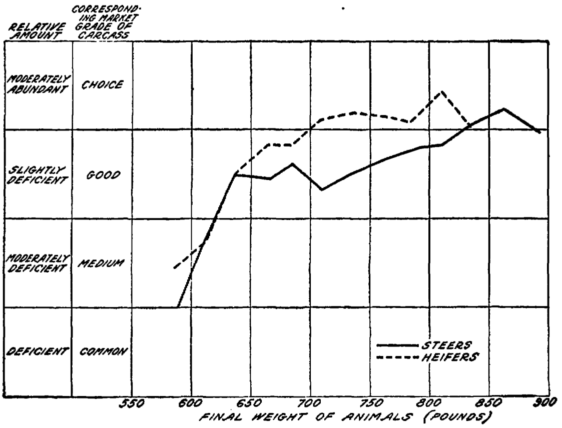

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California beet-growing area is already quite well known, although much remains to be determined about the details of the pest's flight and the relative importance of various portions of the breeding area. This information is essential before the possibilities of reducing populations in the breeding areas, either through reduction of the host plant or by direct action against the insects, can be determined and accurate estimates of probable injury can be made.

The study of breeding areas from which this pest infests the three States named has brought forth some very definite information on the distance of flight which has heretofore been lacking as far as the Mountain States are concerned, but which tends to confirm some of the findings of earlier workers regarding distances of flight in other regions. During the spring of 1931 flights of 250 to 300 miles into the central Utah sugar-beet area were made. These flights, although reaching their maximum distance in a week or 10 days, apparently consisted of a series of short hops, by which the infestation was carried gradually farther from the breeding area.

Methods of Determining Source and Movement of Insects

Two methods have been used in checking the direction, intensity, and speed of these movements and in locating the source of the migrating insects. One method is illustrated by the study of the movements in Utah in 1931.

There are at least three possible sources of the leaf hoppers that infest the beet-growing region from the Great Salt Lake south in Utah, as indicated by areas where Eutettix is known to breed in large numbers. One of these is to the south in Utah, Nevada, and Arizona; a second to the west in western Nevada; and a third in the San Rafael and adjoining deserts in eastern Utah. Small breeding areas occurring around the Great Salt Lake can be disregarded in this discussion because, as the insects matured much later, only the young, unwinged stages of the spring brood were present at the time of the first infestation. The method of investigation involved ascertaining the distribution of the leaf hopper previous to flight, detecting and tracing the daily progress of the first movements, and determining the size of populations along routes leading toward the suspected breeding areas. Three routes were selected, one leading toward the western Nevada territory, a second toward that in southern Utah, and a third toward the eastern Utah section; and careful population studies were made along them before the first insect flights. Previous experience had indicated that populations of the leaf hopper on favorable hosts become higher as the source of the insects is approached. Early surveys along these dispersal routes indicated an almost total absence of the leaf hopper, the few present being dark overwintering forms in contrast to the light-colored spring forms which are almost exclusively present in spring dispersal flights. The first influx of the leaf hopper was discovered at the southern end of the beet-growing area at Richfield, about 170 miles south of Salt Lake City. The men assigned to the various routes were notified by wire and each possible route of movement was carefully checked. The results were negative except for the route leading toward the southern Utah and Nevada breeding areas, where the population increased with progress southward. One observer, following the daily progress of the infestation northward, found that the sugar-beet area

around Great Salt Lake was reached on the fifth day after the bugs were discovered in Richfield.

A second method of determining the source of the flight and the size of the movement has been utilized at Twin Falls, Idaho, where the beet-growing section is rather closely surrounded on all sides by at least potential breeding areas. This has involved the use of a trap (fig. 7) devised for intercepting the insects in flight. The insects are screened out of the air passing through the trap and are concentrated and killed in a cyanide jar attached to the bottom. These traps are mounted on poles at heights of 10 to 50 feet and placed around the beet area in such a way as to intercept flight from all directions. Counts of the catches at regular intervals indicate the intensity of the flight throughout the season, and the distribution at various trap stations shows the direction from which the insects are coming. These data, when combined with data on the distribution of infestation in cultivated and breeding areas, point to the source of the leaf hoppers.

FIGURE 7.—Traps used in studies of leaf-hopper dispersal at Twin Falls, Idaho

The Problem of Long-Range Prediction

This work in Idaho has emphasized the difference in source of leaf-hopper infestation from year to year and has brought out some of the difficulties in long-range prediction of leaf-hopper abundance. The 1930 infestation came mainly from one area, the 1931 from another. Although the 1930 contributing area had fairly high early populations in 1931, these were practically eliminated by drought early in May and no bugs were brought to maturity for the spring flight. In other years undoubtedly both areas have contributed. The relative importance of the various breeding areas has probably varied from year to year according to initial populations, winter severity, precipitation during the fall and spring months, and host-plant development. Except for the spring rainfall, all these factors can be determined before spring development. Spring rainfall and temperatures occasionally affect the final populations in a given area to an extreme degree, even to the point of wiping them out almost completely, as this year in the one area which has been mentioned. Under these conditions accurate analysis of the results in any year is closely associated with the correct estimate of the relative number of leaf hoppers contributed by each of the possible sources. Early estimates of probable abundance must take into consideration local conditions in the breeding areas of highest populations and their previous contribution to the spring flight under comparable conditions.

Accurate determination of the exact source of the infestation for each year is thus a problem of major importance, and its solution will contribute much to an understanding of factors involved in determining the size of the flight and the consequent amount of injury.

P. N. ANNAND *and* E. W. DAVIS,
Bureau of Entomology.

BERRY Breeders Seek New Varieties Adapted to Specific Purposes In breeding new berry varieties it is essential to recognize the desirable qualities as well as the weaknesses of the commercial sorts now grown in the regions of the country for which the new varieties are intended. The use now made of each variety in the home, in the restaurant, and in industry must also be considered. As far as possible new varieties should possess the desirable qualities of the present commercial sorts in the various regions and the qualities desired by industries, and should not have the weaknesses of present varieties. New uses may be found for varieties with new qualities.

Berry breeding by the United States Department of Agriculture is directed to specific objectives, as, for example, producing a leaf-scorch resistant strawberry for the South; a strawberry variety with fruit resistant to the rots for humid regions; a mildew-resistant productive sort of the Clark type for the Hood River section; varieties that do not turn bitter during the harvesting season for regions having hot, dry weather; varieties with tough skins for long-distance shipments; deep-red acid varieties for canning; light-red tart sorts for preserving; and sweet, highly flavored varieties for eating out of hand. Similarly, raspberry breeding is directed toward obtaining better preserving, canning, and shipping sorts, and developing varieties for the Southern States through utilizing foreign species. In blackberry breeding emphasis is being placed on breeding for thornless sorts, for firm berries with high flavor, and for hardy varieties with the desirable flavor of the Logan and the Young.

Usually the desirable qualities in any two varieties of strawberry may be combined in a new variety if a sufficiently large number of crosses are made. The seedlings resulting from a cross of two sorts usually form a series grading almost imperceptibly from one parent to the other. In raspberry and blackberry breeding the results are usually what would be expected in Mendelian inheritance. The most difficult part of all berry breeding lies in recognizing the best among a large number of seedlings.

The Ettersburg 121 Strawberry

The rapidity with which industries adopt varieties better adapted to specific uses is best illustrated by the case of the Ettersburg 121 strawberry. This variety was introduced about 1913. Its superior canning qualities were soon recognized, and it became prominent in Oregon about the time of the World War. At present most of the strawberries canned in the United States are produced in the Willamette Valley of Oregon because it is there that profitable crops of the Ettersburg 121 variety can be produced. The Cuthbert red raspberry has been found the best sort for canning and jam making, and the raspberry-canning

Accurate determination of the exact source of the infestation for each year is thus a problem of major importance, and its solution will contribute much to an understanding of factors involved in determining the size of the flight and the consequent amount of injury.

P. N. Annand *and* E. W. Davis,
Bureau of Entomology.

BERRY Breeders Seek New Varieties Adapted to Specific Purposes In breeding new berry varieties it is essential to recognize the desirable qualities as well as the weaknesses of the commercial sorts now grown in the regions of the country for which the new varieties are intended. The use now made of each variety in the home, in the restaurant, and in industry must also be considered. As far as possible new varieties should possess the desirable qualities of the present commercial sorts in the various regions and the qualities desired by industries, and should not have the weaknesses of present varieties. New uses may be found for varieties with new qualities.

Berry breeding by the United States Department of Agriculture is directed to specific objectives, as, for example, producing a leaf-scorch resistant strawberry for the South; a strawberry variety with fruit resistant to the rots for humid regions; a mildew-resistant productive sort of the Clark type for the Hood River section; varieties that do not turn bitter during the harvesting season for regions having hot, dry weather; varieties with tough skins for long-distance shipments; deep-red acid varieties for canning; light-red tart sorts for preserving; and sweet, highly flavored varieties for eating out of hand. Similarly, raspberry breeding is directed toward obtaining better preserving, canning, and shipping sorts, and developing varieties for the Southern States through utilizing foreign species. In blackberry breeding emphasis is being placed on breeding for thornless sorts, for firm berries with high flavor, and for hardy varieties with the desirable flavor of the Logan and the Young.

Usually the desirable qualities in any two varieties of strawberry may be combined in a new variety if a sufficiently large number of crosses are made. The seedlings resulting from a cross of two sorts usually form a series grading almost imperceptibly from one parent to the other. In raspberry and blackberry breeding the results are usually what would be expected in Mendelian inheritance. The most difficult part of all berry breeding lies in recognizing the best among a large number of seedlings.

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and frozen-packing industry has centered largely in western Oregon and Washington, where the Cuthbert variety is most extensively raised.

Though raised extensively for canning, the Ettersburg 121 strawberry has not been found to be well adapted to other purposes. Partly for this reason and partly because it produces well only in a few areas, it has not occupied an important place in the strawberry industry. A variety adapted to more conditions than the Ettersburg 121 and to other uses than canning would be of greater value. To this end both the Oregon State Experiment Station and the United States Department of Agriculture, by crossing varieties of known canning qualities with other sorts, have originated and introduced excellent canning sorts, the Corvallis and the Redheart, respectively. These varieties, however, are more than just canning sorts. The Corvallis is also an excellent fresh table berry, being one of the highest flavored of all strawberries. The Redheart, too, is an excellent table berry, a good long-distance shipper, and has much wider adaptation than the Ettersburg 121 or the Corvallis, succeeding fairly well even in the Northeast on rich soils.

Varieties Introduced in the East

For the region extending from New Jersey to Georgia the Blakemore strawberry has been introduced by the Department of Agriculture both as a general market berry and also as a preserving sort of superior color, texture, flavor, and pectin content. During the winter of 1931–32 cooperating nurseries and the North Carolina Coastal Plain Branch Station at Willard are introducing two other new sorts, the Bellmar and the Southland. The Bellmar is being introduced as a general market sort believed to be superior to the Howard 17 (Premier) for the New Jersey to Maryland region, and the Southland as a home-garden sort of high quality for Southern States.

It is doubtful whether present varieties have all the desirable qualities that might be found in wild berries. Therefore selections of wild berries of all kinds are being made and put under cultivation for comparison and crossing with cultivated varieties. A few years ago an explorer of the Department of Agriculture went into the highlands of the Andes Mountains of South America for a strawberry grown there; another explorer sent back a wild strawberry from Kashmir, northern India; still another found a wild one in Manchuria; and other explorers have sent in strawberries from the tops of the mountains of Taiwan (Formosa) and of the Hawaiian Islands. With the help of forest rangers, selected wild strawberries have been obtained from many parts of the western United States. Through the cooperation of the Oregon State Experiment Station and the United States Forest Service in Alaska many selections of the beach strawberry of the Pacific coast are being used in breeding. Many other persons and agencies have also assisted in collecting superior wild forms. It is hoped that greater resistance to frost and to drought, as well as more vigorous growth through the short days of winter, may be obtained by the use of such wild sorts for breeding. The finest wild blackberries, dewberries, currants, gooseberries, and shadblow (Juneberries or service berries) to be found are also being collected for use in breeding.

George M. Darrow *and* George F. Waldo,
Bureau of Plant Industry.

Big Trees, Relic of an Ancient Flora, now Found Only in Sierra Nevadas The big tree, *Sequoia Washingtoniana*, greatest and oldest of living things, grows in the very heart of the beautifully timbered Sierra Nevadas. Relic of an ancient flora, it is now found only in the Sierras in a well defined zone and at an elevation of approximately 5,000 feet. Its cousin, the redwood, *Sequoia sempervirens*, occurs only in a narrow strip along the Pacific coast. These species, confined to California, are the only ones left of a dozen or more which once spread over North America, Europe, and Asia.

Traveling easterly from the great valley of California into the Sierras, one goes from grassy foothills to thickets of brush and oak woodlands, and gradually climbs into the ponderosa pine belt. Above this are the heaviest and most valuable stands of mixed coniferous timber in the Sierras. Big trees like to associate with other Sierra species, and within this zone they occur in isolated groves. Above the foothills the terrain gradually takes on a more definite form with high level ridges and deep sharp canyons. The tributaries of these main canyons, which become less rugged near their heads, often terminate in shallow grassy basins where deep, rich, moist soils prevail. In these sheltered valleys the trees thrive.

The widely separated groves of big trees extend along the west slopes of the Sierras from the Forest Hill Divide group of five living and two down trees in the Tahoe National Forest, to Deer Creek Grove of 300 trees east of Porterville in the Sequoia National Forest. There are in all approximately 70 groves, each containing from 5 to 1,000 trees over 5 feet in diameter breast high. Southerly from the Tahoe group at a distance of 60 miles and opposite Stockton in the San Joaquin Valley lie the North Calaveras and South Calaveras groves containing 158 and 946 big trees, respectively, over 1 foot in diameter, 6 feet above the ground. Forty miles southward in the Yosemite National Park is the Tuolumne grove with 20 trees and the Merced grove with 40. Within another 20 miles is the Mariposa grove with the Speckerman and Fresno groves near by. South 40 miles is the isolated McKinley grove of 160 trees. There is a 15-mile gap between this grove and the Kings River. Between the Kings and Kern Rivers, the big trees are found in greatest abundance; here in a distance of 60 miles there are approximately 50 groves. Here are found Sequoias 25 feet in diameter breast high, containing upwards of 500,000 board feet, and probably more than 3,000 years old. The most imposing big trees are within the General Grant and Sequoia National Parks, the latter containing the best-known grove, the Giant Forest.

964 Big Trees Within 415-Acre Area

When the United States acquired the privately owned South Calaveras grove in the Stanislaus National Forest, the Forest Service made a detailed estimate of the pine, fir, and cedar within the area and measured each big tree accurately. In an area of 415 acres there were 964 big trees, 12 inches and over in diameter 6 feet above the ground, and many thickets of reproduction. There is also a heavy intermingling stand of other conifers, young and old.

The largest and tallest big trees are close to Big Tree Creek. The Louis Agassiz, the largest tree in the grove, is 30 feet in diameter at

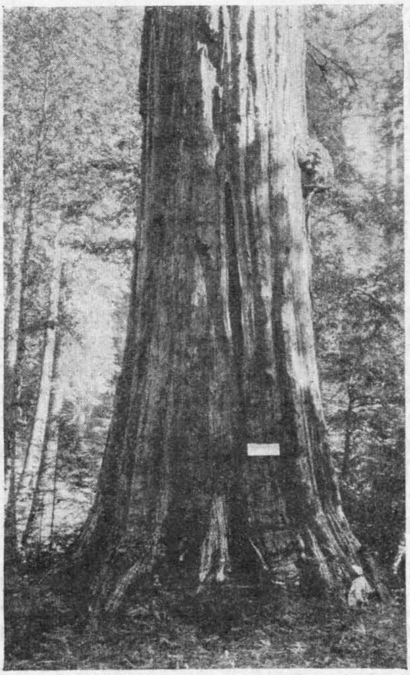


FIGURE 8.—The Louis Agassiz, largest of the big trees

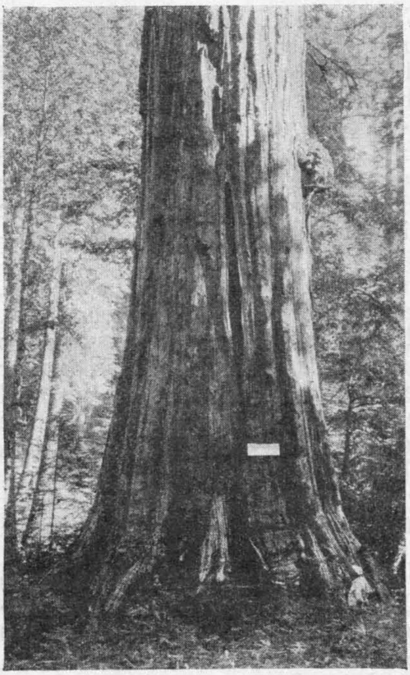
its base, 23 feet 6 inches in diameter 6 feet above the ground, and 18 feet 1 inch in diameter 19 feet above the ground. Its height is 250 feet. (Fig. 8.) The tallest tree in the grove is 330 feet high. The greatest volume of lumber is in the Governor Stoneman tree, which contains 179,000 board feet, or sufficient lumber to build twenty 5-room bungalows. The larger limbs, 100 feet above the ground, are 6 feet in diameter. Big trees occur here singly and in groups of from 2 to 6 and are well distributed over the entire area. Memorial plaques on many of them are reminiscent of botanical and earlier American history.

On entering the big-tree groves one is struck by the massive columns of strength and beauty, the bases fluted to support the great weights; the tapering boles clothed with a soft, cinnamon-red, deeply furrowed bark; and the heavily foliaged, bluish green crown lifting itself 100 feet above the surrounding forest. Towering above all its fellows, the big tree is indeed the king of the world's forest trees.

OSCAR EVANS, *Forest Service.*

BIRD Refuges Can Be Made on Every Farm and Are Valuable Farmers, more than any other group, will be interested in the establishment and maintenance of effective bird refuges, for the welfare of crops and the commercial success of the farm are intimately related to the numbers and kinds of birds present and to their economic tendencies. Against certain more-or-less injurious species control measures are sometimes necessary; but the great majority of birds are from slightly to almost exclusively beneficial in their relations to the farm, and thus to man. The useful species merit the fullest protection and should be encouraged in every possible way.

The economic value of birds lies chiefly in their destruction of injurious insects. Leading an active life, they require much food and are the most ravenous enemies of insect pests. The various groups of birds differ so much in habits that they feed upon practically all groups of insects; hardly an agricultural pest escapes their attacks. The alfalfa weevil has 50 different bird enemies; the army worm, 43; billbugs, 110; the cotton-boll weevil, 66; the brown-tail moth, 31; chestnut weevils, 85; the chinch bug, 29; clover-root borers, 94; the clover weevil, 48; the codling moth, 36; the cotton worm, 41; cutworms, 98; the forest tent caterpillar, 32; the gypsy moth, 46; horseflies, 49; leaf hoppers,



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175; the orchard tent caterpillar, 43; the potato beetle, 34; the rice weevil, 22; the 12-spotted cucumber beetle, 42; white grubs, 95; and wireworms, 205.

In feeding, birds not only take a great variety of insect pests, but frequently destroy them in very large numbers. Often more than 100 individuals are devoured at a meal, and if the insects are small the number sometimes reaches several thousand. It is not surprising that occasionally birds with such appetites entirely destroy certain insects locally. A number of cases are known in which trees, garden crops, and even farm fields have been completely freed of insect pests by birds. On a 200-acre farm in North Carolina it was found that birds were destroying green bugs, or wheat aphids, at the rate of 1,000,000 a day.

A particular farm may not have so large a bird population as is desired, and therefore may not be deriving the benefit from birds that is its due. The most effective means of increasing the number of birds on the farm is protection, and such protection in its best sense is afforded by making the farm a bird refuge.

Cooperation with Various Agencies

Bird refuges on farms have been most successful when established and maintained on a cooperative plan by the landowner or landowners and a State game commission, an Audubon society, a local bird club, or a school. The owner agrees to the use of the land and acts as warden, and the other party to the contract furnishes and places posters, bird houses, and feeding stations, or even stocks the refuge, as in reservations for game birds. The beneficial effect upon trespass problems of establishing a bird refuge is a great advantage to the farmer. State laws authorizing game wardens to proceed against trespassers on bird reservations greatly increase the effectiveness of private and cooperative bird refuges.

The cooperative bird refuge has been tried in many States as a means of establishing colonies of game birds, such as pheasants, and the plan has invariably proved popular and successful. As a method of protecting insectivorous birds it has been put into practice by schools, local bird clubs, and Audubon societies in New Hampshire, Connecticut, Illinois, and Minnesota, at least, and has been found satisfactory and effective.

It is not meant to imply, by the foregoing, that refuges established by individuals are impracticable—far from it. After all, interest in the welfare of birds is the underlying factor most essential to success, and, that granted, the creation of a refuge on any farm is sure to be attended by some degree of success. The more farms participating in the movement the better it will be not only for birds but for the farms.

In making a bird refuge of a farm, attention should be given primarily to cover, food supply, and water. Modern clean farming leaves slight accommodations for nesting birds. The old-time shrubby fence row or hedge offered food, shelter, and nesting places, compared with which the present-day brushless wire constructions are of no value as attractions to birds. If birds are desired, either some shrubby growth should be permitted along fences, or the deficiency should be made up by planting suitable fruit-producing and other shrubs in gullies, on ditch banks, and in various odd corners.

Wild Fruits That Birds Like

Planting should always take into account the food-producing qualities of the material used. Among the wild fruits most frequently patronized by birds are elderberry, blackberry, mulberry, dogwood, wild grape, sumac, cherry, holly, blueberry, pokeberry, and service berry. Some of these plants often can be spared in thinning or clearing operations, and most of them can be planted to advantage for ornament as well as for their bird-food value.

Along with the development of clean farming, the character of tree growth on farms has changed; there are not so many old trees as formerly, and in consequence there are fewer sites for the nests of hole-inhabiting birds. This deficiency can be made up by supplying bird boxes, a desirable step anyway if we are to preserve a fair population of the cavity-nesting birds, some of which are among the most useful.

That water for drinking and bathing is required goes without saying, and if the wants of birds in this respect are not filled by natural streams or pools, artificial provision should be made.

Simple ways of meeting the requirements of birds for water, for nesting sites, for shelter, and for food are set forth in a series of Government publications, any of which may be obtained from the Department of Agriculture upon application. These are the following: How to Attract Birds in the Northeastern United States (Farmers' Bulletin 621), How to Attract Birds in the Northwestern United States (Farmers' Bulletin 760), How to Attract Birds in the Middle Atlantic States (Farmers' Bulletin 844), How to Attract Birds in the East Central States (Farmers' Bulletin 912), Homes for Birds (Farmers' Bulletin 1456), Local Bird Refuges (Farmers' Bulletin 1644), and Gourds for Bird Houses and Other Purposes (Leaflet 36). There can also be had from the Bureau of Biological Survey a list of publications, obtainable from other sources, on attracting birds (Bi–159), and a list of dealers in devices for attracting birds (Bi–160).

W. L. McAtee, *Bureau of Biological Survey*

BUTTER Stored in 1-Pound Prints Keeps as Well as if Stored in 64-Pound Tubs

Butter for storage is usually packed in tubs or boxes which hold about 64 pounds. Circumstances sometimes make it desirable to store the butter in 1 or ¼-pound prints. In this form there is a much greater surface area per unit weight of product than when the butter is in a solid mass.

Observations have been made on the keeping quality and loss in weight of butter stored in 1-pound prints.

In 1928 the Navy Department stored sweet-cream butter in 1-pound prints, wrapped in brine-soaked parchment paper but not placed in cartons. The butter was made by creameries in Minnesota and Wisconsin, shipped to Minneapolis in tubs and there made into 1-pound prints with a power-operated printer. The butter was from 3 to 10 days old when printed. It was then shipped to San Francisco in refrigerator freight cars and placed in storage at about 0° F. In February, when the butter was 7 to 8 months old, it was scored by a competent butter judge. The butter represented 18 churnings from three creameries. One of the churnings scored 91, eight of them 92, and nine of them 93.

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For the last eight years a creamery in Pennsylvania has stored 20,000 to 25,000 pounds of print butter annually in a commercial cold-storage warehouse in Washington, D. C. The butter was made from unripened, pasteurized sweet cream and was of very fine quality. It was printed at the creamery with a 1-pound hand printer, placed in dry parchment wrappers and paraffined cartons, and packed in wooden boxes of 50 pounds capacity. It was shipped by express to Washington and stored at a temperature of approximately 0° F. Some of it was held as long as seven months. Upon removal from storage it was sold to people who were accustomed to getting fresh butter from that creamery. A critical examination of the butter showed a slight surface taint but during the eight years that the storage butter has been used the quality has been satisfactory to the consumers. This indicates that the surface taint was so slight that it escaped the consumers' attention.

Prints Weighed Individually

In order to determine loss in weight during storage nine hundred and fifty 1-pound prints were weighed individually at the creamery and weighed again after six months' storage at 0° F. The butter for this investigation was taken from regular churnings at the creamery, and was printed and packed as described above. It was shipped to a cold-storage warehouse in Washington, D. C., where it was held at about 0° for six months. The loss in weight of individual prints varied from 0 to 1/3 ounce. Some of the greater losses were probably due to the presence of unincorporated water, that is, water in large drops which escaped after the first weighing.

The loss in weight was affected but slightly by the position of the print in the case. The outside prints lost, on an average, 1/60 ounce per print more than the inside prints.

The manufacturing data at the creamery showed that the butter from three churnings was firm while that from two was soft. The soft butter lost 1/32 ounce per pound print more than the firm butter.

Among the nine hundred and fifty 1-pound prints only three lost as much as 1/4 ounce. The soft butter lost an average of 1/7 ounce and the firm butter 1/9 ounce per pound. The average loss for all prints was a trifle less than 1/8 ounce per 1-pound print. This is at the rate of nearly 8 ounces on 64 pounds, which is the amount usually allowed for shrinkage when packing 64-pound tubs.

These observations indicate that sweet-cream butter in 1-pound prints may be held in cold storage for at least seven months without material deterioration in flavor and that, when the moisture is well incorporated in the butter, the shrinkage should not exceed 1/8 ounce per 1-pound print.

WILLIAM WHITE, *Bureau of Dairy Industry.*

CABBAGE Variety Jersey Queen Adds Early Strain Resistant to Yellows The yellows disease of cabbage is one of the most hazardous diseases of this crop except in those northern sections such as New York State and northern Wisconsin where the climate is too cool for its development. It is caused by a persistent fungus (*Fusarium conglutinans*), which, when once introduced, remains indefinitely in the soil. The only suc-

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The manufacturing data at the creamery showed that the butter from three churnings was firm while that from two was soft. The soft butter lost 1/32 ounce per pound print more than the firm butter.

Among the nine hundred and fifty 1-pound prints only three lost as much as ¼ ounce. The soft butter lost an average of 1/7 ounce and the firm butter 1/9 ounce per pound. The average loss for all prints was a trifle less than ⅛ ounce per 1-pound print. This is at the rate of nearly 8 ounces on 64 pounds, which is the amount usually allowed for shrinkage when packing 64-pound tubs.

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FIGURE 9.—The plot of severely infested soil where cabbage selections are tested for resistance to the yellows disease. The two rows at the right were planted with a susceptible variety of cabbage; nearly all plants succumbed to the disease. At the left are two pure lines of Jersey Queen which resisted the disease perfectly

cessful control of this disease is through the development of varieties of cabbage that resist the parasite. Since 1912 several resistant varieties have been introduced, among which are two late varieties, Wisconsin Hollander and Wisconsin All Seasons, and three midseason varieties, Marion Market, Globe, and All Head Select.

FIGURE 10.—A mature head of Jersey Queen cabbage. The shape of head is similar in every respect to that of the mother variety, Jersey Wakefield

Until recently a resistant strain of early-maturing type has not been available. However, there has now been perfected a resistant strain from the Early Jersey Wakefield variety, which is popular as an early-market and home-garden cabbage. To distinguish this new strain from the mother variety it has been named Jersey Queen.

Jersey Wakefield is very susceptible to yellows. In badly diseased soil 95 per cent of the plants commonly succumb. It was from the small percentage of survivors that the new variety, Jersey Queen, was developed. By selection from such survivors and reselection over a period of years were developed pure lines which completely withstood the disease on soil so

severely infested with the yellows parasite that most plants of a susceptible variety succumbed. (Fig. 9.) From these pure lines many plants were eliminated because of their failure to correspond closely to the Jersey Wakefield in earliness, type of head, and other characters. One of these pure lines was chosen after three years of close comparison with the mother variety. This line was made the basis for multiplication.

The new variety is very similar in type to the better strains of Jersey Wakefield, with which it has been compared. It matures just as early and as uniformly as the earliest strains of the mother variety. The average weight per head is equal to that of the early strains of Jersey Wakefield. The characteristic pointed head is maintained (fig. 10), and the core is inclined to be somewhat shorter.

Seed of this new variety is now being made available through the seed trade. Inquiries regarding sources of supply may be directed to the Department of Agriculture.

J. C. Walker, *Bureau of Plant Industry.*

CAMPS in the National Forests Attract Farm Folk Seeking Recreation Increasing use of the conveniently located national forests of Oregon and Washington is being made by people from the agricultural lands of the interior where summer temperatures make the lowlands uncomfortable. Summer sun on fallow and stubble, quivering heat on orchard and field, are more bearable when an ever-extending road system makes it possible to reach the forest-bordered streams or lakes of the national forests within a few hours.

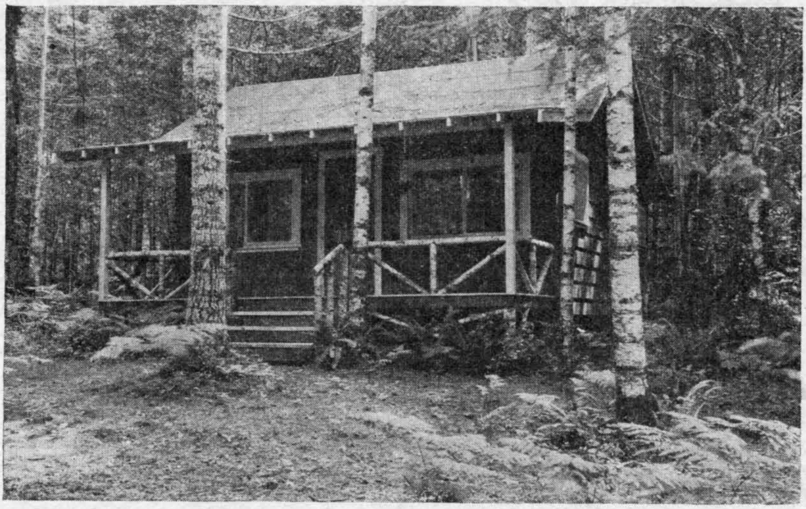

Figure 11.—An attractive and inexpensive summer home in an Oregon national forest

The Forest Service has anticipated this recreational use and has carefully planned for it by setting aside tracts of land along streams, lakes, and highways for the use of the public. Each person can find somewhere within reach of his home a place in the national forests which will exactly meet his need as a refuge from summer heat. He

severely infested with the yellows parasite that most plants of a susceptible variety succumbed. (Fig. 9.) From these pure lines many plants were eliminated because of their failure to correspond closely to the Jersey Wakefield in earliness, type of head, and other characters. One of these pure lines was chosen after three years of close comparison with the mother variety. This line was made the basis for multiplication.

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Seed of this new variety is now being made available through the seed trade. Inquiries regarding sources of supply may be directed to the Department of Agriculture.

J. C. Walker, *Bureau of Plant Industry.*

CAMPS in the National Forests Attract Farm Folk Seeking Recreation Increasing use of the conveniently located national forests of Oregon and Washington is being made by people from the agricultural lands of the interior where summer temperatures make the lowlands uncomfortable. Summer sun on fallow and stubble, quivering heat on orchard and field, are more bearable when an ever-extending road system makes it possible to reach the forest-bordered streams or lakes of the national forests within a few hours.

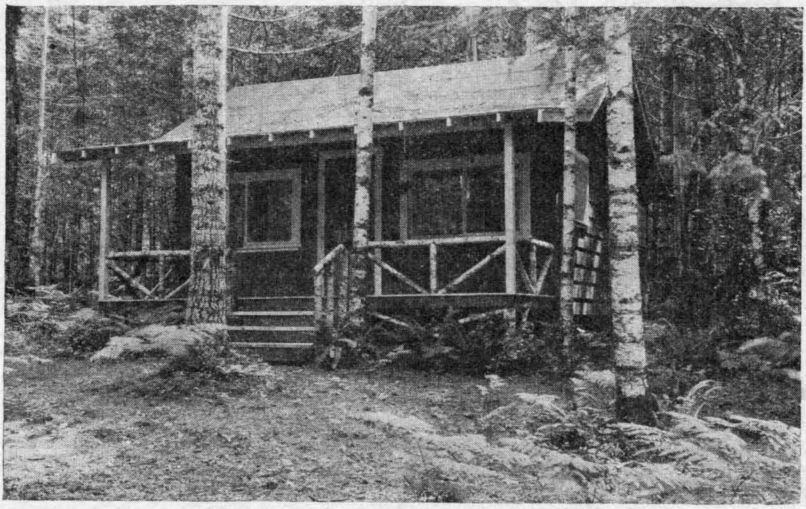

FIGURE 11.—An attractive and inexpensive summer home in an Oregon national forest

The Forest Service has anticipated this recreational use and has carefully planned for it by setting aside tracts of land along streams, lakes, and highways for the use of the public. Each person can find somewhere within reach of his home a place in the national forests which will exactly meet his need as a refuge from summer heat. He

may wish to put up his tent on one of the many free public camp grounds, where wood and water are to be had for the taking. He may desire to live at one of the many resorts, a cabin camp, or a hotel. He may wish to secure a permit and build a cabin where he can be alone, or perhaps the younger members of the family may join one of the numerous organizations which operate summer camps on the national forests. (Fig. 11.)

The free public camp grounds meet the greatest demand since their use involves a minimum of effort and expense. In fact, the only cost is that of getting to the camp and back home. Restrictions are few, pertaining only to fire and sanitation. These free camp grounds are laid out in desirable locations, and in many cases simple improvements such as water systems, cheap tables, and sanitary conveniences are provided. If actual use may be taken as a measure of their service, these national-forest camps are filling a clearly expressed need as refuges from the dusty heat of the lower farming lands.

F. V. Horton, *Forest Service.*

CATTLE-DIPPING Vats of Octagonal Shape Meet with Success in Nevada

Constructed first as an experiment, an octagonal cattle-dipping vat, built in Elko County, Nev., during 1931, proved so successful that stockmen of the county promptly built several more vats of the same type. The dipping vat customarily used in eradicating cattle scabies

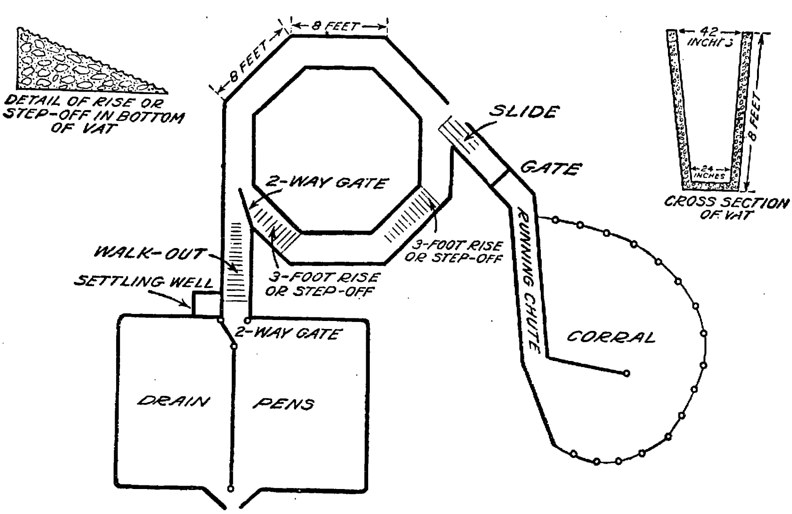

FIGURE 12.—Plan of octagonal dipping vat

and several other parasitic diseases of livestock is a long trench or trough commonly built of concrete, wood, or metal, containing a medicated solution through which animals are made to swim. The movement of animals through the vat is controlled by men stationed at the sides of the vat, who operate gates and also push each animal entirely under the surface at least once, so that the solution may reach parasites on the head as well as on other parts of the body.

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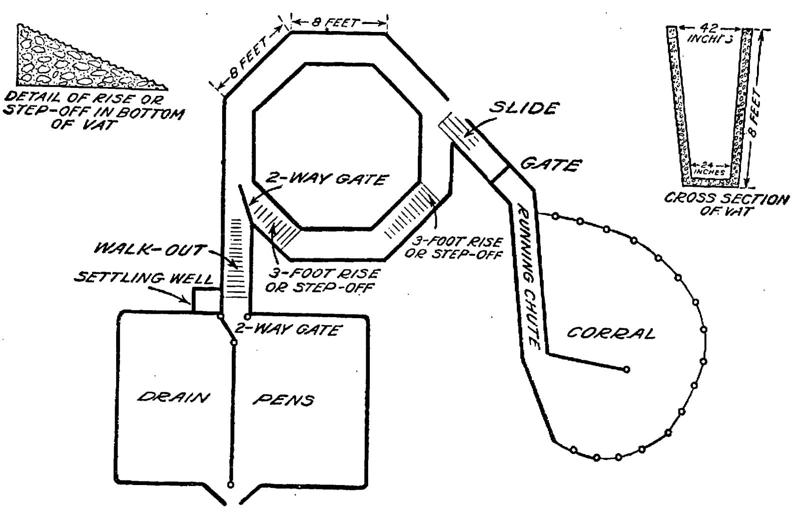

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The octagonal type of vat, though more expensive to build than a straight one, has proved to possess several advantages that more than offset the additional construction cost when large numbers of animals are to be dipped. The main points of superiority are: (1) The dipping operation is more thorough; (2) it is almost automatic; (3) it is easier on the cattle than the old method; and (4) it permits a larger number of cattle to be dipped without the vat being recharged with fresh solution.

The octagonal vat consists of an 8-sided trench made preferably of concrete and so arranged that the animal must swim around for the required time of dipping, usually two minutes, before being released.

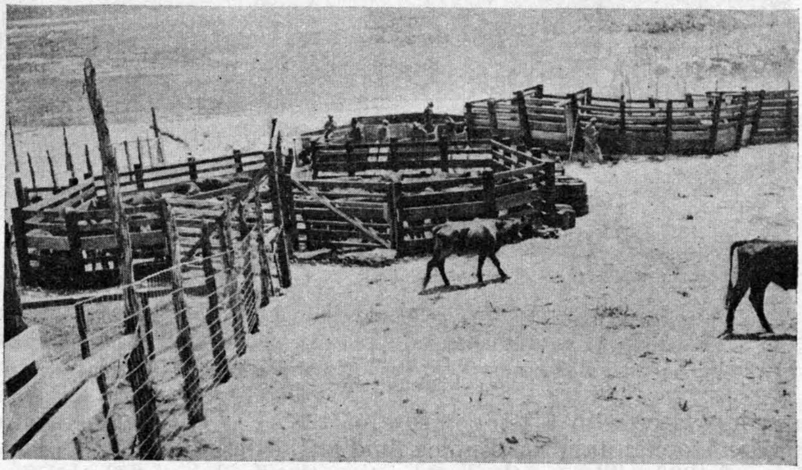

FIGURE 13.—General view of the drain pens, dipping vat, and corrals

In this way the usual fretting caused by the necessary waiting in a straight-trench vat is prevented. A submerged ledge at the entrance causes each animal to duck itself on entering the vat and two other step-offs or drops (fig. 12) automatically give additional duckings. The outside circumference of the octagonal vat here described and illustrated is 64 feet, and the dip capacity is approximately 5,000 gallons. Such a vat will hold 8 mature cattle or 10 yearlings at one time. As many as 180 cattle have been dipped in an hour, and in one instance 819 cattle were dipped in five hours. Since several hundred thousand dippings are frequently necessary in eradicating cattle scabies from a single county, large-scale equipment materially expedites the work. The octagonal vat is not recommended, however, when fewer than 3,000 head of cattle are to be dipped.

Dipping Cattle Affected with Scabies

The new type of vat is especially convenient in dipping cattle seriously affected with scabies. Such animals should be immersed about four minutes. When this length of immersion is necessary, the exit gate is kept closed until the animals have made enough trips around the vat for the required time to elapse. The gate is then opened and the animals enter the walkout which leads to the drain pen. (Figs. 13 and 14.)

The cost of an octagonal vat, including a steam boiler for heating the dipping solution, has ranged from $1,500 to $1,800. With one exception these figures represent contract jobs and in most cases include corrals for holding the cattle before and after dipping.

An unusual feature of one vat is that the dipping fluid was heated with spring water warmed by an extinct geyser. A 2-inch pipe leading from the spring extends around the vat a few inches from the bottom,

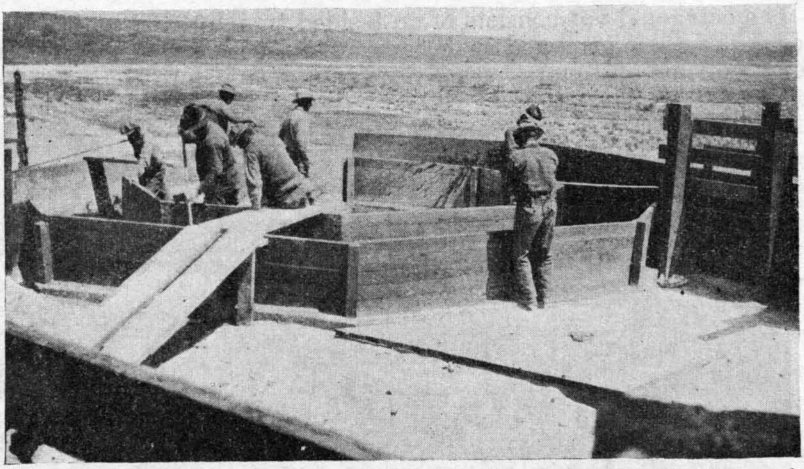

FIGURE 14.—An octagonal dipping vat in operation. The attendants need only to keep the animals moving while they are in the vat

carrying water with a temperature of 128° F. This temperature is sufficient to maintain the dipping fluid at the desired uniform temperature of 102°. This method of heating the fluid saved the cost of a heating plant and the cost of fuel for heating the fluid during each operation.

L. C. BUTTERFIELD, *Bureau of Animal Industry.*

CHEESE Production Is Still Largely Confined to a Few Areas in U. S. Cheese production in the United States, like the production of many other agricultural products, is very largely confined to certain definite areas. In these areas it appears that the climate, soil, and other natural advantages, including the inclinations of the agricultural producers, are especially favorable to cheese production. Originally the cheese industry was localized in New York, Wisconsin, and Ohio. New York became famous for the flat and twin styles of American Cheddar cheese which to-day are referred to as "State Flats" and "State Twins" in many of the country's leading cheese markets. The Swiss-cheese industry has been extensively developed in Green County, Wis., and in parts of Ohio, with the result that Monroe, Wis., is known far and wide as the "Swiss cheese capital" of the United States. Brick and Limburger cheese factories were located in Dodge County, Wis., whereas the eastern, southwestern, and northwestern counties of that State produced principally an American Cheddar type of cheese. In recent years production of various Italian varieties of cheese has developed in California, whereas New York has continued to be the leading State in production of cream and Neufchatel cheese.

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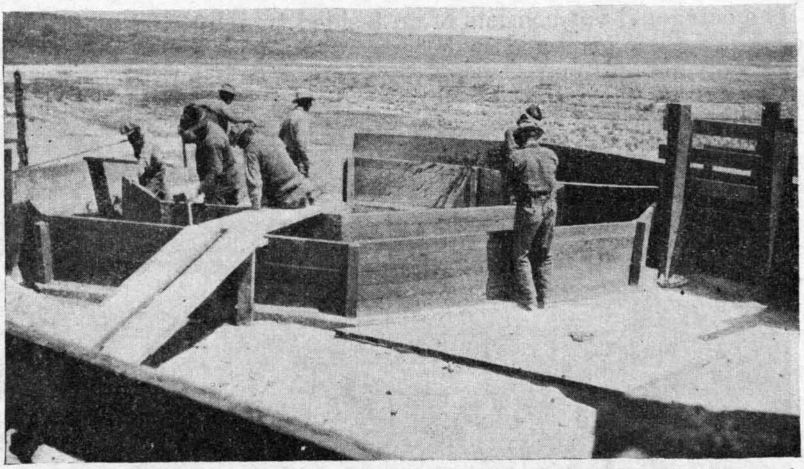

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Generally speaking, the production area of the so-called foreign types of cheese, especially Swiss, Limburger, and the Italian varieties, has always been more limited than has the American Cheddar cheese territory, principally because of the factor of nationality and the methods of production. Consumers of these cheeses desire a flavor in the domestic product which is closely comparable to that of the imported variety. For that reason, cheesemakers are commonly employed who have knowledge of the methods of manufacture used in a foreign country that produces a particular type of cheese. The manufacturing processes of certain foreign types of cheese are often complicated and the makers must be naturally adapted or have the ability and patience to produce the particular type of cheese. For these reasons the production of most foreign types of cheese has in the past been limited largely to communities where the people were chiefly of one nationality.

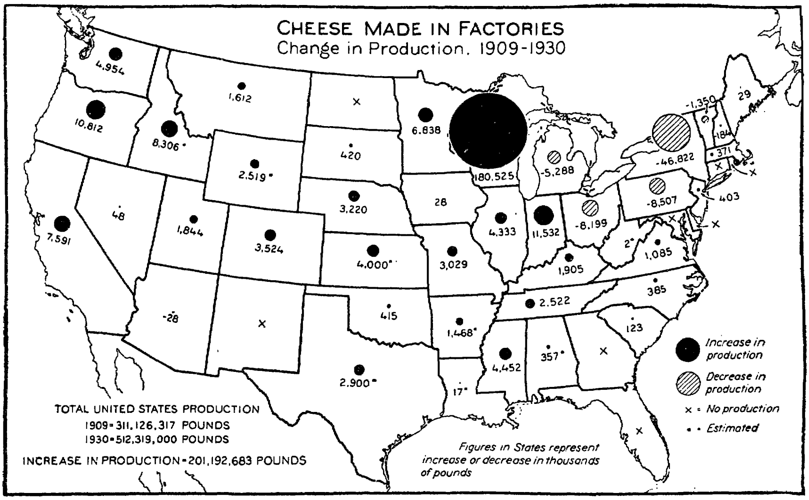

FIGURE 15.—Increases and decreases in manufacture of cheese in different States

Shift in Producing Areas

The rapid growth of the large industrial centers in the East brought about an increased demand for milk for fluid consumption, and as producers were able to realize a greater return from milk sold for fluid use than for milk delivered to the cheese factory, a shift occurred in the cheese-producing areas. The migration of cheese producers from New York and other Eastern States to the Middle West further contributed to this movement. New York became less important and Wisconsin gained in importance as a cheese-producing State. Dairymen on the Pacific coast realized that because of abundant pasturage and forage crops, favorable climatic conditions, and higher transportation costs on cheese shipped from the East and Middle West, there was an opportunity for cheese production in the West; consequently California and Oregon became important cheese-producing States toward the close of the nineteenth century.

With the trend of cheese production away from the territory around the large cities (fig. 15), decreases in production occurred in New York,

Pennsylvania, and other Eastern States. Michigan became less important as a cheese State as the automobile industry developed and the manufacturing cities in the eastern part of the State required the milk from the cheese areas for market-milk purposes. In Wisconsin, also, cheese production shifted toward the northern part of the State and away from the large cities at the foot of Lake Michigan. On the Pacific coast, the cheese industry expanded rapidly in California during the period 1910–1920, but since 1920 production has barely held steady, because rapidly increasing quantities of fluid milk were needed for city consumption.

Another shift in cheese production that occurred during the last four years, and one of prime importance in so far as the industry as a whole is concerned, was in the South and Southwest. The diversification of farm crops, the eradication of the cattle tick, and the ravages of insect pests in cotton were among the factors that contributed to the pro-

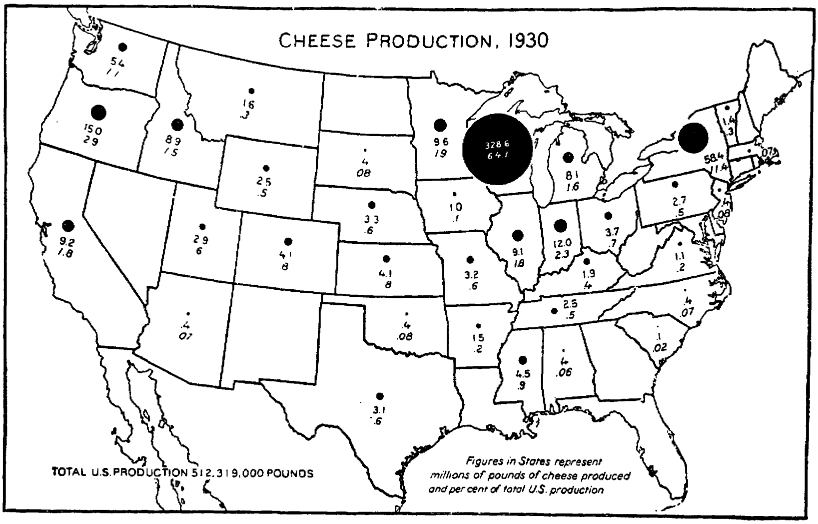

FIGURE 16.—Manufacture of cheese in different States in 1930

duction of nearly 24,000,000 pounds of cheese in 1930 in 19 States of the South and Southwest. As late as 1927 cheese production in southern territory was of minor consequence. The home market in the South has enabled the southern producer to compete quite successfully with the northern producer, with the result that much of the Wisconsin cheese that was formerly consumed in the South, especially during the cotton-picking season, must now find other markets.

Wisconsin and New York Still Lead

Despite recent changes in the cheese-producing areas, Wisconsin and New York are still the leading cheese-producing States. (Fig. 16.) The former State continues as the leading producer of American Cheddar, Swiss, Brick, and Limburger, whereas the latter not only ranks second in American Cheddar cheese production, but also is the principal producer of Cream and Neufchatel cheese. The Italian varieties are produced chiefly in California.

Per capita consumption of cheese in 1930 reached the high point of 4.7 pounds, which exceeded the previous high record of 4.6 pounds reached in 1929. An almost steady gain in per capita cheese consumption is registered since 1917 when, because of war conditions, total cheese consumption declined very materially because many potential consumers were abroad, engaged in war activities. Therefore the decline in per capita consumption from over 3.5 pounds in 1914 to 2.9 pounds in 1917, was not truly representative.

The increase in per capita consumption of cheese during the last 20 years may be attributed to a number of factors, among which are more extensive advertising of the food value and use of cheese, the adjustment of cheese quality to meet consumer demand, more convenient packaging, and the increased use of cheese in the various so-called cheese specialities. Among the more important new developments in the manufacture and marketing of cheese during the last two decades must be mentioned the production of process cheese about 11 years ago, the development of artificially refrigerated curing rooms and with it more scientific curing methods, and the invention of means for marketing natural cheese in packages more convenient to the retailer.

W. J. VENSKE, *Bureau of Agricultural Economics.*

CHESTNUT Lands Planted to Pine Stands Become Valuable in Northeast

Before the chestnut blight spread through the forests, magnificent pure stands of chestnut were frequent in the Northeastern States. Little chestnut now remains, save dead trees and young sprouts which are presistently put forth, only to succumb to the disease. Rehabilitation of such blight-killed areas is an important forestry problem, especially where other valuable species to seed in the spaces left by the chestnut are lacking.

Studies made by the Northeastern Forest Experiment Station in cooperation with the Massachusetts State College show that although natural replacement is adequate on these blight-killed areas, the best way to restore them to full growing capacity is to plant the bare spots with a high-grade timber species such as northern white pine. Since 1924 three permanent sample plots have been maintained on typical blight-killed chestnut land at Sunderland, Mass. Two plots are located where northern white pine was planted in 1919 when the dead chestnut trees were removed. On the third plot no planting has been done and the dead chestnut trees are still standing.

In 1929, 10 years after planting, the plots clearly showed the advantages of artificial over natural replacement. All the plots are now entirely covered with young growth—the planted plots have approximately 1,000 trees an acre, and the natural plot 810 trees to the acre. But the present stand on the planted areas is composed almost exclusively of the commercially valuable northern white pine, while on the naturally restocked area more than 50 per cent of the trees are of such commercially valueless species as red maple, moosewood, and witch-hazel. In effect, on the planted plots potential brush land of low value has been converted in less than a decade into a young stand of high economic importance.

However, in converting cut-over chestnut areas to conifer stands, the sprout growth is a serious obstacle. The competition for soil nutri-

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ments and moisture by the live stumps and the competition for light and crown space by the relatively faster-growing hardwood sprouts, interfere with the development of young conifers. On one of the two planted areas, weeding was practiced. Where the hardwood sprouts have been checked the pine canopy overtops that of the sprouts by about 3 feet. Where no weeding was done the conifers are overtopped by practically the same distance. On the weeded plot, 70 per cent of the pines have their crowns entirely free, whereas on the unweeded area only 50 per cent escape partial or total suppression.

Where the planted stock is small and the chestnut sprouts are tall, weeding prevents early suppression and frequently the death of planted trees. Thus the time required for the next timber crop to reach merchantable size is shortened and there is an earlier return on the investment. It is recommended that the first weeding take all the hardwood sprouts. Subsequently, less desirable seedlings can be removed to release enough selected individual trees to form a mature stand of highest grade timber.

Paul W. Stickel, *Forest Service.*

CHICK Leg Weakness May Be Prevented by Special Attention to the Feed When chicks are reared in strict confinement, two types of leg weakness, caused by incompleteness in the diet, may occur. One of these, more correctly called rickets, is caused by a deficiency of vitamin D in the diet. The other type, known as nutritional perosis, or deforming leg weakness (fig. 17), is very probably caused by a dietary deficiency which, as yet, is not well characterized.

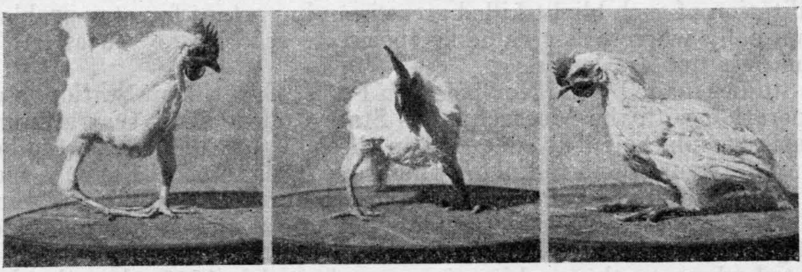

Figure 17.—Typical positions of chickens affected with nutritional perosis

When a chick is suffering from rickets, the bones of the legs become thickened and soft and the percentages of calcium and inorganic phosphorus in the blood serum are markedly decreased. This condition can be prevented by adding from 1 to 2 per cent of cod-liver oil to the diet.

Although cod-liver oil is very effective in preventing rickets, it appears to be of no value as a preventive of perosis. In fact, the writer's experience has been that perosis is not likely to occur when some diets are fed, unless they do contain either cod-liver oil or some other source of vitamin D. The ash content of the bones and the calcium and inorganic phosphorus content of the blood serum are not altered in chicks afflicted with perosis, and this fact distinguishes perosis from rickets.

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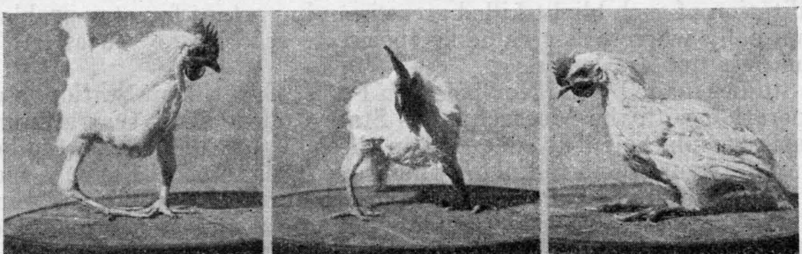

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time in a squatting position. Within a few days the joints become noticeably enlarged, and sometimes the skin covering them has a bluish green cast caused by small hemorrhages in the underlying tissues. This stage in the development of perosis has been called "enlarged hocks" and "hock disease." This seems to be the turning point in the development of this condition, since in some cases, especially among White Leghorns, the chicks may recover to such an extent that there is scarcely any noticeable permanent deformity.

Bending of the Lower Bones

Almost simultaneously with the hock joints becoming enlarged, the two lower bones of the legs, especially the one to which the toes are attached, show a slight bending which is very readily apparent when the chicks are X rayed. As the condition develops, these bones become more and more curved until gross deformity results. This stage has been referred to as "deformed leg bones." Frequently, in severe cases, the joint cartilage slips a little at the lower end of the second bone and the main tendon slips from its place, leaving the hock joint permanently disabled. This stage has been frequently called "slipped tendon."

Various workers have suggested that nutritional perosis is caused by feeding an excess of mineral matter, particularly bone meal. Although it appears to be true that excess mineral matter may have a tendency to aggravate the condition, experiments conducted at the United States Animal Husbandry Experiment Farm, Beltsville, Md., clearly indicate that a mere excess of mineral matter does not cause perosis to develop. These experiments have further shown that the relative amounts of calcium and phosphorus in the diet are very important. They also seem to indicate that rice bran is of considerable value in preventing nutritional perosis. By adding about 10 per cent of rice bran to two widely different types of diet which had caused the condition to develop, and simultaneously adjusting their calcium-phosphorus ratio to approximately 2.5:1, it has been possible to rear a number of groups of chicks without the occurrence of a single case of perosis.

In the typical diet consisting of corn meal, wheat or wheat by-products, dried milk, and meat scrap, the addition of 2 per cent of finely ground limestone will give a calcium-phosphorus ratio very close to the desired value.

HARRY W. TITUS, *Bureau of Animal Industry.*

CHINA'S Demand Large for Some U. S. Products, Despite Low Incomes An American farmer traveling into the interior of China, and walking across the countryside on the paths that connect the innumerable villages, is at once impressed with the great number of people on every hand—in the fields, in the farm huts, in the villages, and in the shops—and with the meager living standards, if not the poverty, of the masses. Not much purchasing power is evident. Individually, it is very small. But a number of foreign wares touch the lives of these people and the small individual demand totals to a surprising volume if any substantial part of the vast population is reached. Various conditions have brought about a significant demand for certain Amer-

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HARRY W. TITUS, *Bureau of Animal Industry.*

CHINA'S Demand Large for Some U. S. Products, Despite Low Incomes

An American farmer traveling into the interior of China, and walking across the countryside on the paths that connect the innumerable villages, is at once impressed with the great number of people on every hand—in the fields, in the farm huts, in the villages, and in the shops—and with the meager living standards, if not the poverty, of the masses. Not much purchasing power is evident. Individually, it is very small. But a number of foreign wares touch the lives of these people and the small individual demand totals to a surprising volume if any substantial part of the vast population is reached. Various conditions have brought about a significant demand for certain Amer-

ican farm products, the principal items being cotton and flue-cured tobacco from the South, wheat flour from the Pacific Northwest, and fresh fruits from the Pacific coast.

Cotton

In recent years cotton has taken the leading place among these products. Prior to the World War a modern spinning industry was only partly developed in China but the war stimulated a rapid expansion and now after a rather stationary period of seven years the industry is again expanding. To-day China has approximately 4,000,000 spindles and, instead of importing cotton yarn heavily, as was the case before the war, has a small net export trade. In spite of this growing spinning industry, home spinning is still extensive.

FIGURE 18.—Home spinning continues to be a common practice in China

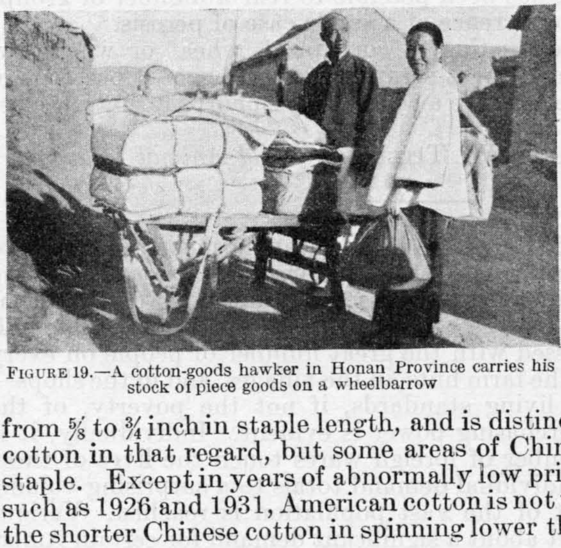

FIGURE 19.—A cotton-goods hawker in Honan Province carries his stock of piece goods on a wheelbarrow

For its spinning industry, China is only partly dependent on foreign cotton, since the bulk of consumption is of Chinese growth from a commercial crop of more than 2,000,000 bales and from a farm crop of around 3,000,000 bales annually. Most Chinese cotton ranges from ⅝ to ¾ inch in staple length, and is distinctly inferior to American cotton in that regard, but some areas of China produce ⅞ to 31/32 inch staple. Except in years of abnormally low prices in the United States, such as 1926 and 1931, American cotton is not used in competition with the shorter Chinese cotton in spinning lower than 20-count yarn. Un-

til the present time the spinning of higher count yarns has been done largely in Japanese-owned mills which represent about one-third of the total spindles of China, and consumption of American cotton has been largely by these Japanese mills. But there is an evident tendency on the part of Chinese mills to spin higher counts and to use some American growth in mixtures for 20-count yarn. Imports from the United States during the 1930 crop year reached 450,000 bales. Higher tariffs on cotton piece goods, particulary those levied in a measure that became effective January 1, 1931, have stimulated the weaving industry. As this industry grows, more and more of the longer-staple cotton will be needed. Certain districts in China, already growing staple that competes with American cotton, are capable of a larger production, but this development is contingent upon improvements in transportation and marketing, and upon political conditions.

Cigarettes

The cigarette business in China, with which the United States leaf trade is associated, depends for its volume upon low price per unit and upon thorough distribution. With no other essentially foreign article has it been possible to keep the price per unit down so low that an appeal can be made to the masses in a population variously estimated at 250,000,000 to 400,000,000. With few other foreign articles has there been such a thorough distribution. The bulk of sales consists of cigarettes that sell to dealers at 10 or more for 1 cent. Many of the retail sales consist of single cigarettes. It is a common sight to see a coolie buy two cigarettes, place one behind his ear for later use, and leisurely smoke the other; or he may save his first cigarette when it is half used. Even such low prices are prohibitive for millions of Chinese, especially in distant places where heavy transportation charges must be added or where taxation is excessive. Prices per unit must be maintained at an incredibly low level in order to secure a volume of business.

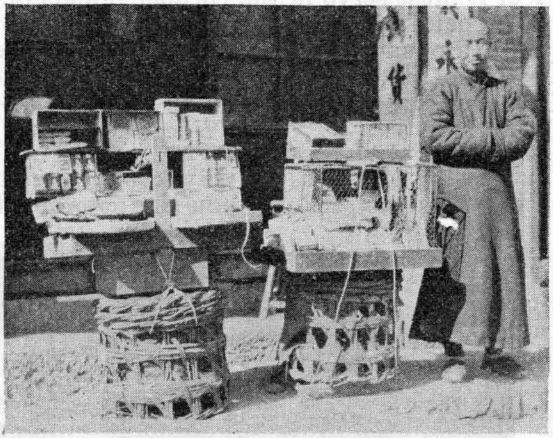

FIGURE 20.—A typical cigarette stand on a street of a Chinese city

But aggregate consumption is tremendous, for cigarettes go into the far corners of this extensive and populous republic. Cigarette peddlers and shops handling cigarettes seem to occur wherever there are streams of traffic or groups of workers. Annual sales in 1930 and 1931 probably exceeded 1,200,000 cases of 50,000 cigarettes each. Political disturbances, irregular taxation, and many difficulties during past years have tested and established the strength of the demand for cigarettes in China. In spite of difficulties, consumption increases. The

considerable replacement of native forms of smoking by cigarettes is chiefly the result of enterprising and resourceful sales promotion and advertising methods by foreign and Chinese companies.

In many foreign countries, habits and tastes have been adapted to domestic tobacco, but in China there has developed such an exclusive preference for cigarettes from American flue-cured tobacco, introduced by foreign companies, that quality in cigarettes is measured in terms of quality of American flue-cured leaf used in their manufacture. With increased cigarette consumption, however, has come a domestic flue-cured tobacco industry that also forms a source of leaf supplies. Foreign companies selected three areas in which the growing of flue-cured tobacco from American seed was introduced, taught, and promoted. Production has changed from year to year, depending considerably on the price paid and the buying activity of foreign companies, but recently low silver exchange has made it necessary for these companies to use more and more domestic leaf. Domestic production in 1931 was approximately 100,000,000 pounds. In general the quality is much inferior to American leaf, as the tobacco is lacking in body and aroma, but when mixed with various quantities of American leaf it must serve in the cheaper brands of cigarettes. The average price paid to growers for the 1931 crop is reported as equivalent to 4 cents a pound. American leaf supplemented local production to the extent of 128,000,000 pounds in 1929 and 144,000,000 pounds in the 1930 crop year.

Wheat and Flour

To sell wheat to China may seem like selling coal to Newcastle since China's annual wheat production is probably more than 800,000,000

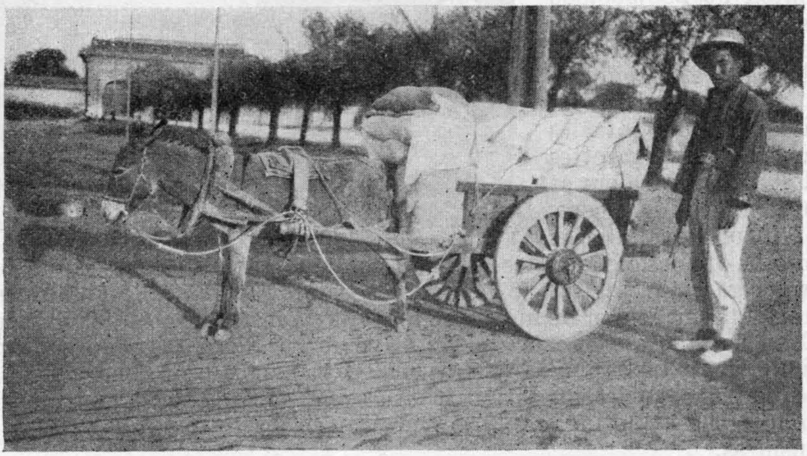

FIGURE 21.—American flour being distributed in the ancient city of Peiping, China

bushels and exceeds our own production, but to a surprising degree population has caught up with the crop production, and surpluses, if any, are small. Then, too, over much of China, lack of railways and lack of cheap transportation facilities limit the movement of grain to distant markets. Famines may occur in Provinces almost adjacent to those having good wheat crops. For certain deficit districts along the coast it is simpler and more economical to import foreign wheat and

flour. In north China wheat is as standard a cereal in the diet as is rice in central and south China. The milling industry in Shanghai, which exports most of its output to ports in north and south China, buys significant quantities of foreign wheat when low grades and exchange rates permit it to buy to advantage, but it is not a consistent user of American wheat. A number of ports in north China are substantial markets for flour from Shanghai, the United States, Canada, and Japan.

FIGURE 22.—Moving lots of American flour at Tientsin, China

Takings from our Pacific Northwest mills seem to be determined by the size of the wheat crop in the Tientsin area, mill operations in Shanghai, and comparative prices. Imports reached the highest figure in 1929 when imports of American flour for all China were 3,300,000 barrels. Not much foreign flour, however, penetrates far from the port cities and our trade is chiefly confined to spots on the coast or to near-by accessible places. Foreign wheat and flour merely touch the fringes of the country and of its food supply.

Other Items

Special aspects of other items in our export trade may be briefly mentioned. American condensed and evaporated milk continues to grow in popularity as food for babies, but the Chinese generally consider these products as medicine rather than as food. Raisins have found a limited place in the Chinese diet and confections, where other dried fruits have failed almost completely. Domestic oranges of many varieties fully deserve their popularity in China but the all-season character of American varieties enables the wealthy Chinese in Shanghai and other port cities to enjoy this fruit during the spring and summer months when Chinese oranges are not on the market. American canned fruits from California are so prized as to be used as gifts at the Chinese New Year celebrations.

Low Silver Exchange Cuts Buying Power

No appraisal of market demands in China can be made without considering the far-reaching effect of the depreciation of silver and with it

the depreciation of the currency of China. Prior to the World War, silver and gold had a relatively stable relationship, but since 1914 silver has gone through a cycle of excessively high and excessively low extremes. Absolute exchange values over a period of years are not so important as reasonable stability. Exchange rates over a 4-year period prior to 1930 were somewhat constant, with the Chinese silver dollar equivalent to 45 cents American currency. In late 1929, however, silver followed the course of commodity prices and during the latter half of 1931 the Chinese dollar was worth less than 25 cents or about one-half of its value in 1928 and 1929. This exchange situation has the same effect as would the doubling of the silver price for foreign goods if the United States price remained stationary. United States prices have dropped but unless the reduction is 50 per cent or more the silver price in China is higher than it was. Chinese wages and domestic price levels have not followed the exchange rate and probably will do so only very slowly, so the depreciation of silver practically represents a corresponding reduction in purchasing power.

Many complications result from this situation. The possibility of an outlet which low prices for certain farm products might create in China has been offset by the exchange rate. High prices in Chinese currency have made many foreign products almost prohibitive. A rise in silver value and in silver exchange would be a helpful development in restoring Chinese purchasing power.

PAUL O. NYHUS, *Bureau of Agricultural Economics.*

CITRUS Fruit Coloring by Ethylene Process Much Improved Lately

Some of the early or fall varieties of oranges and grapefruit ripen while the fruit is still green in color. Later varieties that mature in the spring or summer assume the color of full maturity during the winter while the fruit is still immature, but when warm spring weather occurs the rind may turn green again. Thus while the edible part of the fruit ripens there is a "regreening" of the rind. Grapefruit growing on the inside of densely foliated trees never develops full color, although some of the best-flavored fruit is produced there. There is, therefore, no definite relation between flavor or maturity and the color of the fruit while on the tree. However, there is a very significant relation between the color of the fruit offered for sale and the price that it will bring, and citrus fruit producers have always faced the problem of making the color of ripe fruit match its flavor.

The orange and yellow pigments are located deep in the rind and remain masked so long as there is any green color in the outer rind. After the fruit is picked there is a slow loss of green through natural processes, but under commercial conditions it has become necessary to color the fruit more rapidly without changing its natural flavor.

Various methods of coloring the fruit, such as subjecting it to the exhaust fumes of a gasoline engine or to the pungent fumes arising from the incomplete combustion of kerosene, have been used. Under favorable conditions fruit could be colored by these methods in a few days. However, there was always danger to human life when the gasoline-engine exhaust fumes were confined in the coloring rooms, and the kerosene fumes sometimes imparted a disagreeable flavor to the fruit. In addition, the latter involved a considerable fire hazard and often caused serious property loss.

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Commercial Ethylene Now Used

When it was discovered that ethylene gas is the essential component of kerosene fumes so far as coloring the fruit is concerned, methods were devised whereby commercial ethylene was substituted for kerosene fumes in the coloring process.

Besides the concentration and kind of the gas which is the active agent, other factors upon which coloring depends have been found to be the temperature, humidity, and ventilation of the coloring room. All these factors are influenced by the type of construction, arrangement, and equipment of the room.

Loosely constructed and uninsulated rooms can be used during warm weather, provided the rooms are ventilated frequently, but when artificial heat must be supplied great difficulty is encountered. Unless a uniform temperature can be maintained throughout the room there will be a lack of uniformity in the rate of coloring and it may be necessary to treat some of the fruit for excessively long periods. It is essential to shorten the coloring process as much as possible, because the high temperatures and humidities required are very favorable to the development of stem-end rot and other types of decay.

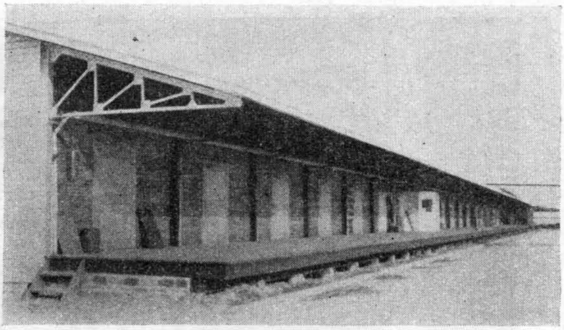

FIGURE 23.—Receiving platform of a Florida citrus packing house showing doors to coloring rooms in which the fruit is placed as soon as received. Packing houses are usually arranged so that the fruit can be moved in a straight line from the coloring rooms through the packing space and into cooling rooms on the opposite side of the building, whence it is loaded directly into refrigerator cars

The greatest practical progress in the development of improved coloring practices has been made since 1929. At that time the Mediterranean fruit-fly outbreak in Florida necessitated the construction of a large number of well-insulated rooms especially equipped for air conditioning in order to maintain the fruit under uniform conditions during treatment for this pest. Rooms of this type proved to be admirably adapted for coloring purposes and have now very largely supplanted the earlier kinds throughout Florida. (Fig. 23.)

Equipment of Coloring Rooms

These coloring rooms are usually rectangular in shape, with the ceiling 7 or 8 feet above a slatted floor supported on 2 by 6's placed over a tight subfloor. Such a floor is essential for good air circulation. Powerful blowers are placed along the side wall or above the ceiling to draw the air from beneath the floor and through a duct to the blowing apparatus, where it is brought to the desired temperature and humidity and where the coloring gas is introduced before the air and gas are forced down through the fruit. (Fig. 24.) The multivane type of blower rather than the propeller type has proved most satisfactory. The blower is equipped with an adjustable opening on the suction side to permit continuous introduction of fresh air and to prevent excessive

concentration of carbon dioxide and other waste gases within the room. In this manner the air in the coloring room is continuously recirculated and uniform conditions are maintained throughout. In a room of 1-carload capacity an actual delivery of at least 2,000 cubic feet of air per minute is desirable.

During cold weather the air is heated by being passed over a large steam radiator and is humidified by steam introduced from a small jet. During warm weather the condition of the air is regulated by passing it through a water spray which absorbs excess heat and raises the humidity. The temperature is controlled by an automatic thermostat to prevent the fruit from becoming overheated during the coloring period.

The ethylene gas is introduced and regulated by two reducing valves attached to the high-pressure cylinder in which it is purchased. The gas is usually released at a pressure of only a fraction of a pound and is conducted through a ¼-inch main-line pipe with laterals leading into

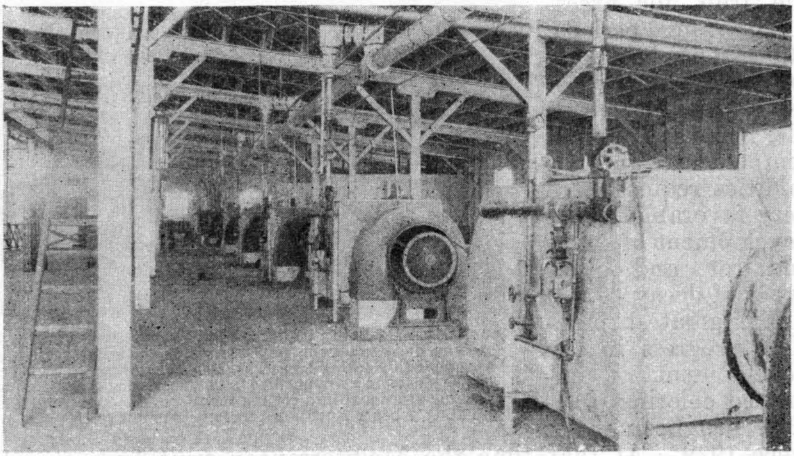

FIGURE 24.—Air-conditioning equipment above ceiling of coloring rooms, showing fans, steam and water pipes, and ethylene gas line

the air-conditioning chamber of each coloring room. At the discharge end of each lateral pipe there is a nozzle with a cut-off to enable one to turn the gas on or off in a given room without affecting the operation of other rooms. The gas is turned on when the room is filled with the fruit and is left on until the coloring is completed. Being thoroughly mixed with the air before its introduction into the coloring room, it is supplied in uniform concentration at all times. It is most satisfactorily used at a rate of about 3 cubic feet per day per room of 1-carload capacity.

Varying Reactions in Different Crops

Experience has shown that few citrus crops react alike to the coloring process, since growing conditions have a marked influence on the rate of coloring. Variable weather conditions and variations in the condition of the fruit itself from time to time, prevent adoption of a standardized coloring procedure. In general, however, it is recommended that the temperature of the fruit should be brought to 80° to 85° F. within two

or three hours if possible. To accomplish this it is sometimes necessary to use live steam, which also brings up the humidity and prevents wilting of the fruit. It is desirable to maintain the relative humidity within the range of 80 to 92 per cent, using the higher humidity at the start of the process. Care must be taken, however, to prevent the fruit from remaining wet for prolonged periods. After the fruit is brought to the desired temperature, live steam in the coloring room can be dispensed with and the desired humidity can be maintained by manipulating the air-conditioning equipment already described.

Ventilation should be provided during the entire coloring period by keeping the fresh-air vent in the air mixer open continuously. The size of the opening necessarily differs with the size and tightness of the room. Usually an opening of 6 to 8 square inches is adequate for a coloring space of 2,200 cubic feet.

Coloring is but one step in handling the fruit from grove to market. It must be coordinated with other essential operations, in all of which one cardinal principle should be emphasized—the maintenance of maximum speed consistent with careful handling, so that the fruit may be packed and cooled without delay.

J. R. Winston, *Bureau of Plant Industry.*

COTTAGE-CHEESE Industry Could Be Expanded with Advantage in Some Areas

Before 1917 cottage cheese did not have the commercial importance that it has to-day. It had been made both in the home and by some dairy plants in various sections. The manufacturing methods commonly used, however, were such that the product was of nonuniform quality and did not create an extensive demand. Nor was any considerable volume of skim milk utilized in its manufacture.

Not until during the World War, when conservation of food and utilization of all food products became a question of economic importance, was there any concerted effort to improve manufacturing methods and to utilize large amounts of skim milk in the manufacture of cottage cheese. At that time, although large quantities of skim milk were being fed to livestock on the farm, millions of pounds were also being poured into creamery and milk-plant sewers. To utilize this waste as a human food the United States Department of Agriculture in 1917–18 inaugurated an intensive campaign to increase the manufacture and consumption of cottage cheese. Many creameries and milk plants throughout the dairy sections of the country took up its manufacture on a commercial scale. This may be said to be the real beginning of the cottage-cheese industry, for since that time its production has increased steadily.

Throughout the campaign cottage cheese was widely advertised in newspapers and on Government posters placed in restaurants, markets, and other public places. The Department of Agriculture also published information on the food value of cottage cheese and developed new methods by which it could be served as a human food in different combinations. The department realized that in order to increase the consumption of cottage cheese it would be necessary for the manufacturers to put a good product of uniform quality on the market. To accomplish this a standardized method of manufacturing was adopted

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and especially trained men were assigned to different sections of the country to work with creameries and milk plants. Practical demonstrations of the method of manufacturing were given at each plant until a satisfactory and uniform quality of cheese was being produced. This introductory work, which was a part of the campaign, stimulated a new and increasing demand for cottage cheese. The manufacturers lost no time in putting a good-quality product on the market. Since that time there has been a steady increase in the annual production of cottage cheese, including pot and baker's, until by 1930 the amount manufactured was 240 per cent greater than in 1918.

According to estimates of the Bureau of Agricultural Economics of the Department of Agriculture, in 1918, the first year for which production figures were available, 28,350,000 pounds of cottage cheese, including pot and baker's, was manufactured. In 1922 the total was 32,389,000 pounds, in 1926 it was 67,977,000 pounds, and in 1930 it was 97,641,000 pounds. The amount of cottage cheese made in 1930 represents 644,430,600 pounds of skim milk, and, at the average price received by the manufacturer for plain cottage cheese, the value of the 1930 production was approximately $6,000,000.

In 1930, 598,008,000 pounds of cheese of all varieties was manufactured in this country. These varieties represent eight different classes and rank in volume of production as follows: (1) Cheddar, which represents 64.6 per cent of all the cheese produced in this country; (2) cottage, including pot and baker's, 16 per cent; (3) brick and Munster, 5.6 per cent; (4) cream and Neufchatel, 5.4 per cent; (5) Swiss, including block, 4.3 per cent; (6) Italian varieties, 1.4 per cent; (7) Limberger, 1.3 per cent; and (8) all other varieties, 1.1 per cent. As to value the order is slightly changed and is as follows: (1) Cheddar, (2) cream and Neufchatel, (3) cottage, including pot and baker's, (4) Swiss, including block, (5) brick and Munster, (6) Italian varieties, (7) other varieties, and (8) Limberger.

A Product of Importance

It has been found that cottage cheese, including pot and baker's, ranks second in volume produced and third in value. According to these figures it would seem that cottage cheese is no longer merely a by-product of the dairy industry but is a product of considerable importance. Many creameries and milk plants in regions where skim milk is available and where a market for cottage cheese can be developed would no doubt find it profitable to give more attention to its manufacture.

To increase the consumption of cottage cheese a good and uniform product must first be made available to the public. To accomplish this there must be a supply of skim milk of good quality. The manufacturer must adopt a method that will produce the particular type of cottage cheese most in demand, then handle the manufacturing process as carefully and as uniformly as he does the manufacture of higher-priced dairy products.

The Bureau of Dairy Industry has recently perfected a method which consistently produces excellent results. By using this or a similar method more dairy-products plants could improve the quality of their cottage cheese and thus utilize their skim milk more profitably.

H. L. Wilson, *Bureau of Dairy Industry.*

COTTON Communities Showing More Interest in One-Variety Plan The advantages of limiting production to a single variety in each community or district are becoming more and more widely recognized among cotton growers and others interested in cotton production. The 1-variety plan has already been adopted and applied in most of the cotton-producing districts of the southwestern irrigated valleys, and the experience in these communities may facilitate the extension and stabilization of the system of organized production in the eastern Cotton Belt.

The primary object of 1-variety organization is to establish and maintain a regular supply of pure seed, to be used as the basis of production by the entire community. (Fig. 25.) The first step to be taken, where an active local interest in the 1-variety plan has developed, is to form a growers' association to which all bona fide growers

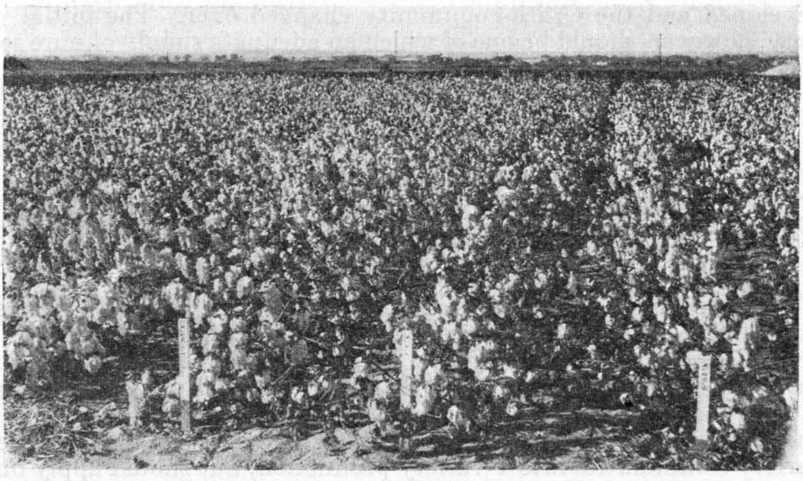

FIGURE 25.—A breeding block of Acala cotton on United States Acclimatization Field Station, State College, New Mexico, where the purity and superior quality of the seed are maintained for organized community planting

within the community should be eligible. To give stability and continuity to the effort, each member should sign a 5-year agreement to plant only the variety of cotton designated by the board of directors.

Community Boundaries

In California the 1-variety districts are designated by counties, and many of the cotton-growing areas of the Southwest are separated from each other by mountain ranges or stretches of unirrigated desert, which afford ample protection from the danger of crossing with other varieties or with other stocks of seed. Where separative geographical features do not exist, as in many parts of the eastern Cotton Belt, more care has to be taken in locating seed-producing areas that can be protected in other ways.

One-variety areas also may be located with reference to soil types, in the interest of safer and more regular production of seed.

A gin unit, or the area from which a single gin draws its custom, may afford a satisfactory basis of a community effort, particularly if the gin is isolated enough to be free from the competition of other gins.

Having all of the custom of one gin of the same variety brings obvious advantages in keeping the seed pure and in being able to regulate the gin machinery so that there is a minimum of damage to the fiber.

Selecting a Variety

Community production of any good variety is better than a multiplicity of varieties. The better the variety selected, however, the easier it is to attain community production. Properly conducted variety tests are the best means of determining the relative value of a variety, but the community organization need not wait for local tests to be made. Recommendations of the State university or extension service can be followed safely, or the association can be formed and the members choose by vote the variety with which to start. In case another variety is later found to be better, a local seed supply can be developed and the entire community changed over. The initial variety, however, should be one of which an adequate supply of pure seed is obtainable.

Final Stages of Community Organization

Most growers can readily appreciate the advantages of 1-variety production, but a community often contains a small proportion of growers to whom these advantages are not so easily discernible. A 100 per cent 1-variety community is therefore much more difficult of attainment than a nearly 100 per cent community, and some means of protection against reactionary growers may be needed.

The gins can be of material assistance in dealing with this problem by refusing to gin outlawed varieties. The communities can also be protected by county ordinances or State laws prohibiting the planting, harvesting, and ginning of other than one variety in districts that are attempting to organize themselves on this basis. Restrictive ginning and legal measures, however, should not be invoked to coerce mixed-variety communities into 1-variety production, but should apply only to communities already established on a 1-variety basis and practically unanimous in their choice of variety.

H. G. McKeever, *Bureau of Plant Industry.*

COTTON Data Record Variation in Staple Length, 1928–1931

Data on the grade and staple of cotton ginned in the United States for three consecutive years are now available, and similar data on ginnings up to December 1 of the fourth year are available. We are approaching the time, therefore, when it may be possible to get some perspective of the trend of staple length—some definite information as to whether the staple length of American cotton is deteriorating or improving. Data covering a period of but three or four years are, of course, inadequate as a basis for definite conclusions, information covering a longer period being required to establish trends with any degree of certainty. But the figures now available do permit of some interesting comparisons.

Figure 26 shows the proportions of the several staple lengths of American upland cotton ginned in each of the three cotton years, 1928, 1929, and 1930; and Figure 27 shows corresponding proportions of these

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Final Stages of Community Organization

Most growers can readily appreciate the advantages of 1-variety production, but a community often contains a small proportion of growers to whom these advantages are not so easily discernible. A 100 per cent 1-variety community is therefore much more difficult of attainment than a nearly 100 per cent community, and some means of protection against reactionary growers may be needed.

The gins can be of material assistance in dealing with this problem by refusing to gin outlawed varieties. The communities can also be protected by county ordinances or State laws prohibiting the planting, harvesting, and ginning of other than one variety in districts that are attempting to organize themselves on this basis. Restrictive ginning and legal measures, however, should not be invoked to coerce mixed-variety communities into 1-variety production, but should apply only to communities already established on a 1-variety basis and practically unanimous in their choice of variety.

H. G. McKeever, *Bureau of Plant Industry.*

COTTON Data Record Variation in Staple Length, 1928–1931 Data on the grade and staple of cotton ginned in the United States for three consecutive years are now available, and similar data on ginnings up to December 1 of the fourth year are available. We are approaching the time, therefore, when it may be possible to get some perspective of the trend of staple length—some definite information as to whether the staple length of American cotton is deteriorating or improving. Data covering a period of but three or four years are, of course, inadequate as a basis for definite conclusions, information covering a longer period being required to establish trends with any degree of certainty. But the figures now available do permit of some interesting comparisons.

Figure 26 shows the proportions of the several staple lengths of American upland cotton ginned in each of the three cotton years, 1928, 1929, and 1930; and Figure 27 shows corresponding proportions of these

staple lengths ginned prior to December 1 in each of the four years, 1928, 1929, 1930, and 1931.

In each of the three years for which data on the entire crop are now available, the proportion of the total crop that was 1⅛ inches and longer in staple constituted less than 5 per cent of the total ginnings. Not only do these lengths constitute a comparatively small part of the crop, but they are grown, for the most part, only in restricted areas. The proportion of the crop ranging in staple length from ⅞ to 1$\frac{1}{16}$ inches, inclusive, grown quite generally throughout the Cotton Belt, constituted approximately 81 per cent in 1928, more than 75 per cent in 1929, and more than 83 per cent in 1930.

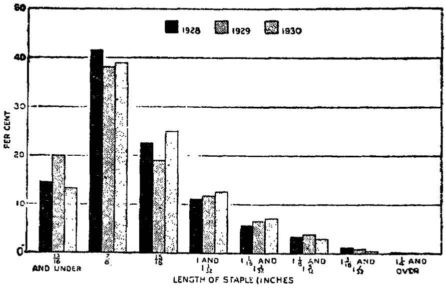

FIGURE 26.—Percentage distribution, by staple length, of cotton ginned in the United States, crops of 1928, 1929, and 1930

Available Figures Inconclusive

Persons asserting that the staple length of American cotton is deteriorating point to the large quantity of cotton shorter than ⅞ inch that was ginned from the crop of 1929, as compared with that ginned from the crop of 1928. It should be borne in mind that, although the proportion of these short lengths increased from more than 14 per cent of the crop in 1928 to 20 per cent in 1929, it decreased to approximately 13 per cent of the crop in 1930. In so far as ginnings to December 1 may be taken as indicative, a further decrease may be expected for 1931. This expectation is based on the fact that cotton shorter than ⅞ inch constituted only about 5½ per cent of ginnings prior to December 1, 1931, as compared with 13½ per cent, 20½ per cent, and 13½ per cent, respectively, for the corresponding periods in 1928, 1929, and 1930. A similar comparison shows that an appreciably larger proportion of cotton ranging in length from ⅞ to 1$\frac{1}{16}$ inches was ginned prior to December 1, 1931, than during the corresponding period in either of the three preceding years. In this connection, attention is called to the favorable weather conditions prevailing throughout a great part of the 1931 season.

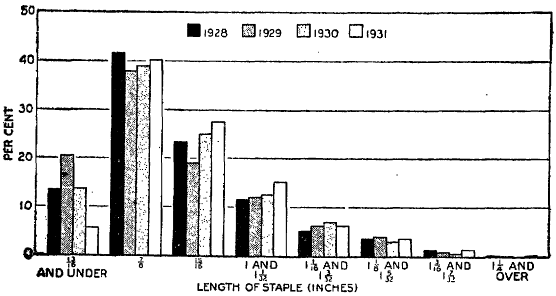

FIGURE 27.—Percentage distribution, by staple length, of cotton ginned in the United States prior to December 1 of the years 1928, 1929, 1930, and 1931

A comparison of Figures 26 and 27 will show that the proportions of the various staples in the ginnings to December 1 have not materially differed from those of the entire crop during the last three years.

Although no official data are available that would indicate the extent of deterioration in staple length of American cotton prior to the inauguration of the grade and staple estimates work of this department, the preliminary figures now available do not indicate that deterioration in staple length has occurred during the last three years.

W. B. Lanham, *Bureau of Agricultural Economics.*

COTTON Exports to Russia Decline as Acreage and Output There Increase

Before the World War, Russia ranked sixth among foreign countries in mill consumption of American cotton. It held a similar place in 1927–28 when the postwar peak of American cotton consumption by Russian mills was reached. In the last few years Russia's home production of cotton has increased considerably, reaching the prerevolutionary peak, and its imports of American cotton declined until they have practically ceased during the 1931–32 season. Russia occupies an important position in the world of cotton. Among cotton-growing and cotton-manufacturing countries it ranks sixth in number of spindles; fifth in production of lint; and fourth in acreage devoted to cotton. The increase in Russian cotton production has attracted widespread attention and given rise to the question: How much competition is the American producer likely to meet from Russian cotton?

The possession of a domestic source of raw-cotton supply makes the Union of Socialist Soviet Republics, as Russia is now officially styled, unique among the European cotton-manufacturing countries. It also has a large domestic market for cotton goods. Although the production of Russian cotton increased rapidly during the pre-war and early war years and again resumed an upward course after the interlude of the revolution and civil war (1917–1921), it has usually not been sufficient to satisfy the requirements of the Russian manufacturing industry. The Russian cotton industry depended, at least until recently, on foreign sources (principally the United States) for a large proportion of its raw material; hence the importance of Russia as a market for American cotton.

American cotton on the Russian market has had to meet the increasing competition of the Russian-grown cotton from Turkestan or central Asia and Transcaucasia. Cotton has been grown on irrigated land in Turkestan and Transcaucasia for many centuries. The former section is especially important and accounts for the bulk of the Russian cotton supply. Cotton in Turkestan is grown by small peasant cultivators who formerly used, for the most part, primitive implements and a prodigious amount of labor in raising the crop on their small plots.

Even before the World War, there was a movement to make Russia self-sufficient, as far as possible, in the matter of raw cotton supply. Both the Government and the manufacturers were interested in this project. Domestic production was encouraged by a high protective tariff on imported cotton, taxation privileges for the growers, extension of railway facilities in the cotton-growing districts, and new irrigation construction on which extension of the Russian cotton acreage principally depended. Such measures, coupled with the fact that cotton is, on the whole, well adapted to the climatic conditions and the small-scale, highly intensive agriculture of Turkestan, resulted in a large expansion of the acreage and production of Russian cotton.

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Expansion in Turkestan

The area devoted to cotton in Turkestan more than trebled between 1890 and 1910, as far as the inadequate statistical data enable one to judge. Considerable expansion in acreage also occurred in Transcaucasia. At the same time, the displacement of native cotton varieties by American upland types proceeded rapidly so that little native cotton was being planted at the outbreak of the war. The expectation of increased prices, with the entrance of Russia into the World War, provided a further incentive to the extension of cotton cultivation and by 1915 Russian cotton production reached a record figure of 1,500,000 to 1,700,000 bales of 478 pounds each.

Consumption of domestic cotton also exhibited an upward trend. In 1890, domestic cotton constituted one-fourth of the total Russian mill consumption (including Russian Poland but excluding Finland); by 1910, it was more than a half; and in 1914, when the peak of Russian mill consumption was reached, it constituted 60 per cent. Consumption of American cotton likewise showed an actual increase, though its relative importance in the total Russian mill consumption declined. In 1890 Russian mill consumption of American cotton amounted to 375,000 bales of 478 pounds, or 62 per cent of the total, and in 1910, 596,000 bales, or 36 per cent of the total.

The World War and the Russian revolution with its consequent economic isolation of Russia and disorganization of economic life, led first to a decline and later to a cessation of imports of cotton into Russia. Imports were not resumed on any considerable scale until 1923. Consumption of American cotton by Russian mills, which was estimated at only 27,000 running bales in 1921–22, increased to 493,000 bales during the season of 1927–28, exceeding even the pre-war record. A rapid decline, however, has followed and apparently little American cotton was consumed during the season 1930–31.

Significance of the Drop in Imports

The downward trend of Russia's cotton imports during the last three years seems to suggest that the country is nearing its goal of cotton independence. But it should be borne in mind that, with a monopoly of foreign trade and of the textile industry, together with the power to ration consumption, the Government can restrict imports in order to maintain a favorable balance of trade, even should the domestic production fall short of replacing imported supplies. The Government appears to be making every effort to push the cotton industry. Contracts with growers for acreage, on the basis of which advances are paid to them, have been made each season. To provide an adequate supply of cheap grain for central Asia so that the farmers could devote a larger acreage to cotton, a railroad connecting Turkestan with the grain regions of Siberia was constructed. Reduced taxation of land under cotton and exemption for a 5-year period of cotton acreage in new growing regions were granted.

Selected seed, modern implements, and tractors are being introduced. In 1923–24 there were only 39 tractors in central Asia; by 1926–27, the number had increased to 1,270; and by 1929–30 to 3,609. Use of mechanical power relieves the shortage of draft animals, which is acute among the cotton growers of Turkestan (many of whose holdings, however, are too small to permit a profitable employment of their

own stock), and as it diminishes the required feed-grain acreage it increases the acreage that may be devoted to cotton. To utilize the available supply of tractors efficiently, a number of them are operated together with other improved machinery under single direction for a number of farms. These units are called "machinery tractor stations." Collective and State farms which accounted for a little over 70 per cent of the 1931 acreage are replacing the small individual grower. However, there are chronic complaints of various defects in the organization of the Russian cotton-growing industry, such as shortage of labor, inadequate supplies, or poor distribution of grain and manufactured articles in the cotton-growing districts, etc. The average yields are below pre-war and have shown a downward trend during the last few years. Nevertheless, in 1930 a crop of more than 1,500,000 bales of 478 pounds (or 68 per cent above the 1909–1913 average production) was harvested, thus reaching the previous Russian peak production of 1915.

Russian Mill Consumption

In 1909–1913, domestic cotton constituted little over half of the total Russian mill consumption. To cover the requirements of the Russian cotton industry, if the output remains at the pre-war level, it would apparently be necessary for the Russian production of cotton to be approximately double that of 1909–1913. However, the present capacity of the spinning industry of the Union of Soviet Socialist Republics is nearly one-fifth less than that of pre-war Russia because of the secession of territory. This, in turn, tends to reduce the raw material requirements, except as the reduction in spindlage may be offset by other factors such as an increase in the number of hours worked, etc. On the other hand, cotton production in 1930 was almost 70 per cent above the average for 1909–1913 and a further increase was expected in 1931 with the larger acreage. It would seem, therefore, that the Soviet Government can not be very far from the attainment of its objective of self-sufficiency on a pre-war basis in the matter of cotton supply.

Although exports of American cotton into the Union of Soviet Socialist Republics are primarily affected by this situation, it is noteworthy that the Government is also planning to develop the growing of Egyptian (long-staple) cotton.

An output of cotton goods not exceeding pre-war quantities would entail a standard of consumption below pre-war standards, as the population of the Union of Soviet Socialist Republics increased between 1913 and 1931 by approximately 15 per cent. Furthermore, a considerable portion of the Russian pre-war supply of cotton yarn and cloth was provided by the highly developed manufacturing industries of the Polish and Baltic regions, which seceded after the revolution and which were formerly not separated by customs barriers from the rest of Russia. Therefore, should an expansion of the Russian textile industry and a rising standard of living of the Russian population occur in the near future, a further considerable increase of Russian cotton production, or alternatively, greater imports of foreign cotton, would be necessary, especially since the growing industrialization of the Union of Soviet Socialist Republics probably would result in the increased industrial use of cotton. On the other hand, there must be borne in mind the possible production of substitute textile fibers. Such substitutes, if found, would, of course, tend to diminish the use of cotton in the future.

Additional Land Available

As far as land resources are concerned, there are undoubtedly opportunities for a further expansion of the Russian cotton acreage as well as for increasing the yield per acre by improved cultural methods. The increase during recent years has taken place largely through the displacement of other crops, principally cereals on the irrigated lands of Turkestan and Transcaucasia. There may be a possibility of a further shift to cotton on irrigated land. Such land was roughly estimated at 11,000,000 to 12,000,000 acres as against a cotton area of some 4,000,000 acres. Not all of the irrigated land can be devoted to cotton; not all is actually sown to crops each year. In the opinion of some Russian authorities cotton should not occupy more than one-third to one-half of the sown area, but others consider a higher proportion of cotton feasible. The irrigated area undoubtedly can be greatly augmented through new construction, but this will involve considerable capital outlay.

A less costly method of cotton expansion is the extension of cotton cultivation into nonirrigated areas. Nonirrigated, dry-farming land of Turkestan is beginning to be utilized on a small scale for cotton; but of far greater importance is the strong effort made during the last two years to develop cotton growing in European Russia, particularly in north Caucasus, Ukraine, and Crimea where cotton was not cultivated previously except on an experimental scale. In 1931, the new cotton areas already accounted for 17 per cent of the total Russian cotton acreage. It is too early to say whether this experiment is really a success. Difficulties are likely to be encountered, especially in view of the extension of cotton cultivation far northward. In any event, the yields are bound to be lower than on the irrigated lands of Turkestan and Transcaucasia.

During the last few years the Union of Soviet Socialist Republics exported small quantities of cotton although the country was on an import basis. These exports were probably dictated by financial exigencies of the balance of international payments. Under a monopoly of foreign trade and the textile industry, sales of the better cotton for the purpose of obtaining foreign currency are likely to occur and may even increase in the future, notwithstanding a short supply of cotton. With Russian exports and Russian imports of cotton the foreign exchange situation is an important factor. In the long run, however, whether the Union of Soviet Socialist Republics will be self-sufficient with respect to cotton, or on an import basis, or (much more problematical) will develop a considerable export surplus of cotton, is likely to be determined largely by the outcome of a race between the standard of living of the Russian population and the capacity for increased cotton production.

L. Volin, *Bureau of Agricultural Economics.*

COTTON Fiber Improvement Necessitates Community Action to Keep Seed Pure

The sexuality of plants and the conveyance of pollen by insects have been studied intensively for the past century, and many curious relations have been revealed. Since the time of Darwin hundreds of floral specializations to attract insects have been described in the

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different families of plants, and insects have been found to be carriers not only of pollen grains but of fungus spores, bacteria, and other microscopic organisms that cause epidemic diseases, such as malaria, yellow fever, typhoid fever, and bubonic plague. Sanitation of seed stocks is necessary in the cotton industry, in order to produce better fiber.

The floral biology of the cotton plant is relatively simple. The flowers are conspicuous, with nectar glands at the base. The large tuberculate pollen grains have their surfaces covered with mucilage and are not carried by the wind, but adhere readily to bees and other insects. (Fig. 28.) Each flower is likely to be visited many times, and bees may come from a mile away. If the trails of the insect visitors could be visualized, the cotton fields of any community would appear to be completely covered and connected by a network of cross pollination. Different breeds of cattle can be fenced in separate pastures, but there is no way to keep cotton from being crossed.

FIGURE 28.—When several varieties of cotton are planted in neighboring fields, bees and other insects that visit the flowers cross-fertilize and mongrelize the different sorts. This results in deterioration of the seed stocks and the production of irregular fiber of poor quality. (About natural size)

Where different varieties are raised in the same community an extensive mixing of seed occurs at the public gins. When this mixed seed is used the work of the bees in crossing the different plants in the fields is a mongrelizing process, leading to an indiscriminate diversity of plant characters and a corresponding irregularity of fiber. (Fig. 29.) Hybrids between different varieties may appear promising in the first generation, but "break up" and degenerate in second and later generations.

Mixing and crossing undoubtedly have increased with the development of the public-gin system since the Civil War. A general deterioration of the fiber has occurred, and now has reached the point at which cotton from other countries to some extent is replacing American cotton in Europe.

More Uniformity of Fiber is Greatest Need

Since the cotton fiber has to be spun by accurately adjusted textile machinery, making the fiber more uniform is the greatest improvement that can be accomplished by selective breeding. Varieties with fiber of any desired length, from ½ to 2 inches, can be produced. Fiber less than 1 inch long is "short staple," which should in general be replaced by uniform varieties with staples 1 inch or more in length. The longer the fiber the greater the need of care in maintaining the uniformity of the seed stocks, if production is to be on a practical scale. For-

merly it was supposed that the discovery or development of better varieties of cotton would bring an improvement of the fiber, but experience shows that the practical possibilities of improvement depend on establishing good varieties in regular, continued cultivation.

On account of the effects of mixing and crossing, the production of uniform cotton depends on isolating the seed stocks of the varieties. Instead of growing different varieties in the same localities, each community or district that undertakes to produce uniform cotton must restrict itself to a single superior variety, in order that the variety may be preserved by keeping the seed pure. Continued selection and roguing also are required in order to maintain a uniform type, but these precautions are of little effect if the seed stocks are not isolated.

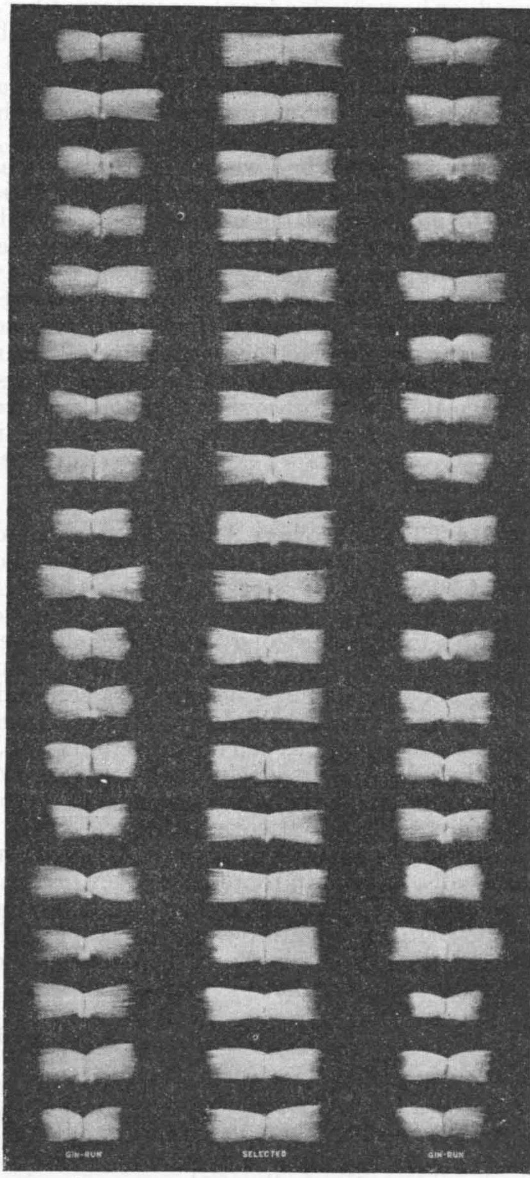

FIGURE 29.—Center row shows uniform cotton produced from pure selected seed. First and third rows show irregular fiber grown from seed of different varieties that have been mixed at the gins and mongrelized in the fields by insects. (One-fourth natural size)

The first step in practical improvement of cotton fiber is to provide the 1-variety conditions for maintaining the necessary supplies of pure seed. The crop must be varietized by communities before the fiber quality can be standardized effectively, that is, before the fiber can be made as uniform as possible, and kept uniform from year to year, during a period of commercial production. The methods of preserving and utilizing superior varieties are a part of the problem of fiber improvement, no less than the methods of breeding and selection.

Better Buying System Needed

Nobody knows how much cotton of more than 1-inch staple would be used, or how much advantage uniform fiber would have in the market, if adequate supplies were regularly available, as has never been the case. The annual production of sea-island cotton in South Carolina, Georgia, and Florida once ranged for many years from 70,000 to 100,000 bales, and several times as many bales of upland long-staple cotton were grown in Mississippi, Louisiana, and eastern Texas. With the arrival of the boll weevil, not only were these crops of long-staple cotton destroyed and the long-staple varieties discarded, but several of the former long-staple markets were abandoned. The tendency that has ruled in recent years, not to discriminate in the quality and price of cotton in primary markets, has stood in the way of improvement of the fiber. Even the slight premiums necessary to encourage planting early and productive varieties with uniform moderate-length staples have often been refused to the farmers, thus discouraging the planting of good varieties and the taking of precautions necessary to keep the seed pure. Hence it is being recognized that the system of buying must be improved, as well as the system of production, in order to improve the fiber.

O. F. Cook, *Bureau of Plant Industry.*

COTTON Growers Advised Not to Try Large-Scale Planting of Sea-Island

Sea-island cotton, when grown from pure selected seed, is the most valuable of the world's cottons. It is a cotton de luxe with a silky staple from 1½ to 2½ inches long, surpassing all other types in length, strength, and fineness of fiber. For the manufacture of sewing thread, laces, fine dress goods, and for woven fabrics combining extreme lightness with maximum strength and durability, such as airplane wings, balloon and parachute cloth, gas cells for dirigibles, etc., sea-island cotton is literally in a class by itself among the world's cotton fibers.

Commercial planting of sea-island cotton is now confined almost entirely to Porto Rico and other islands of the West Indies. The present total annual production is less than 10,000 bales, and practically all of this crop represents fancy grades with staples 1¾ inches long and upward. The longest sea-island cotton is now grown in St. Vincent, British West Indies, where staple up to 2¼ inches and longer is produced from seed of one of the fancy "crop lot" strains imported from South Carolina.

Former Production About 90,000 Bales Annually

Before the invasion of the boll weevil into the Southeastern States, where the sea-island cotton was formerly grown, the average annual production of this cotton was about 90,000 bales. About one-tenth of this production represented fancy grades with fiber from 1¾ to 2¼ inches long, the bulk of the crop ranging from 1½ to 1⅝ inches in length. After the invasion of the weevil, production of sea-island cotton in the Southeastern States rapidly declined and about 10 years ago was practically abandoned.

Anticipating the serious danger of losing the seed stocks, which had been developed through more than 100 years of careful breeding and selection, experiments were immediately undertaken by the United States Department of Agriculture in cooperation with the Agricultural

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Society of South Carolina and interested growers on the Sea Islands, to investigate the practical possibilities of producing sea-island cotton under boll-weevil conditions and at the same time to preserve a stock of planting seed, should interest be revived in this cotton in later years. The experiments included studies of the possibilities in cultural control of the weevils by the improved method of "thick" spacing of the plants in the rows to produce earlier and larger crops; fertilizer tests; and other forms of production improvements, as well as the breeding of earlier strains, and use of the methods of direct protection of the crop by poisons. (Fig. 30.)

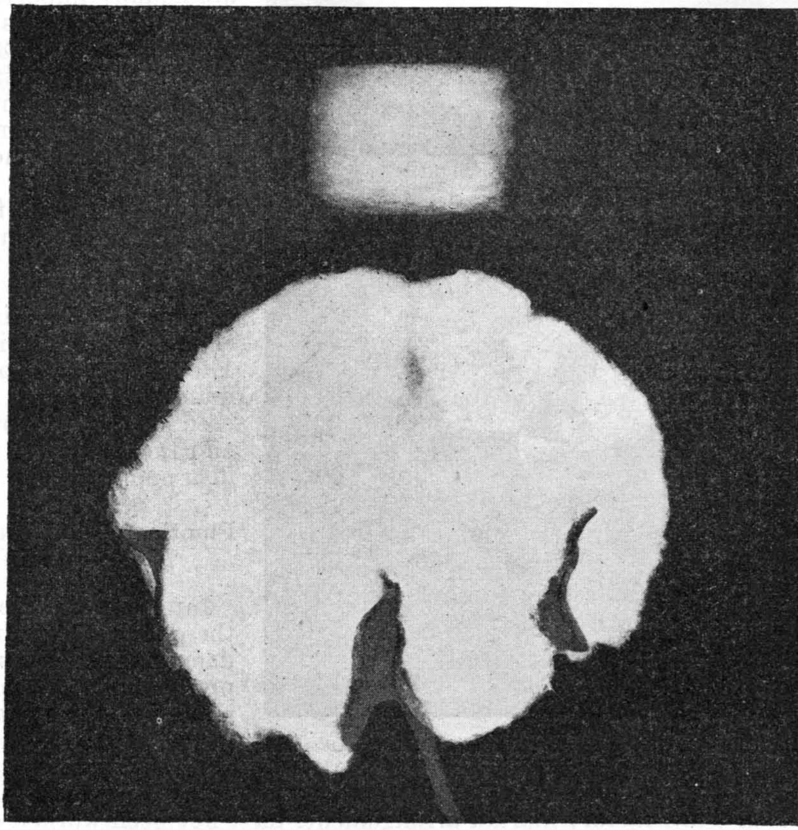

FIGURE 30.—Upland cotton boll. (Natural size.) Compare with sea-island boll

Exclusion of Other Types Necessary

By experimental plantings over a period of more than 10 years, it has been fully demonstrated that sea-island cotton can not be successfully grown under the old system of mixed-variety planting with upland cotton, as formerly practiced by the growers in the mainland districts of Georgia and Florida. Unlike the upland varieties, sea-island cotton is susceptible to serious damage from boll weevils during the entire period of development of the crop, and weevils bred in the flower buds of the earlier upland short-staple cotton usually prevent the setting of a crop on the later maturing sea-island plants.

Experience has shown that the only possibility of successful production under present conditions is in communities or districts devoted entirely to the planting of sea-island cotton, to the complete exclusion of any other variety or type.

In the absence of supplies of sea-island fiber, the American market for this cotton completely disappeared several years ago, and the problems of restoring a satisfactory outlet for the fiber, if and when it is produced, are equally important with the problems of production. (Fig. 31.) A regular supply of the sea-island fiber must be assured in order to reestablish an American market, and, by the same token, a fair price for the fiber must be assured to the growers in order to encourage organized effort to establish isolated sea-island communities where the seed can be kept pure and the quality of the fiber maintained.

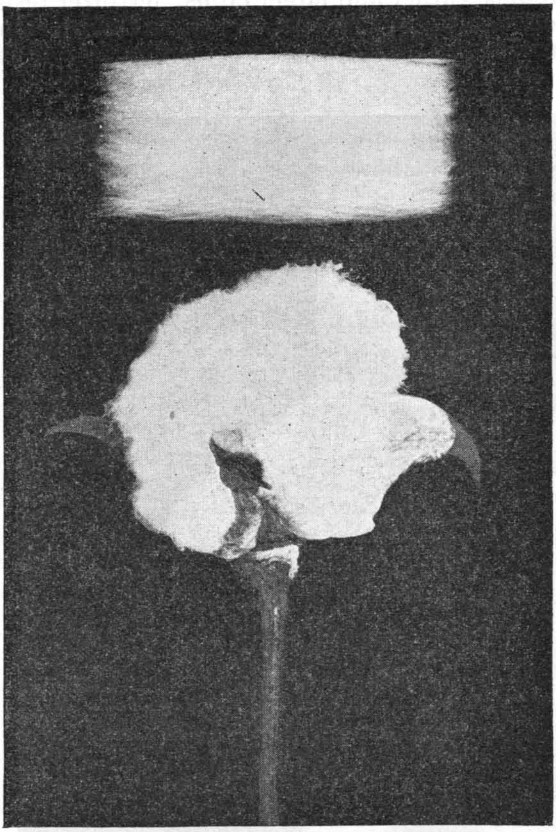

FIGURE 31.—Sea-island cotton boll. (Natural size.) It costs several times as much to pick the small bolls and roller gin the sea-island cotton as it does for upland cotton

Planting of Sea-Island Not Advised

Intensive studies of these and other fundamental problems of production are being made by the department in cooperation with growers and manufacturers. At present, satisfactory market arrangements have not been worked out with manufacturers, and until more information is available, farmers are being advised not to plant sea-island cotton on a large scale anywhere in the continental United States.

C. B. DOYLE, *Bureau of Plant Industry.*

COTTON Progressively Lowered in Grade by Exposure, Tests Show

Weather and exposure lower the grade of cotton. Every cotton farmer knows this and tries to pick his cotton under the best conditions as soon as possible after the bolls are ready. How much change takes place with exposure, and what kind of change, has never been known.

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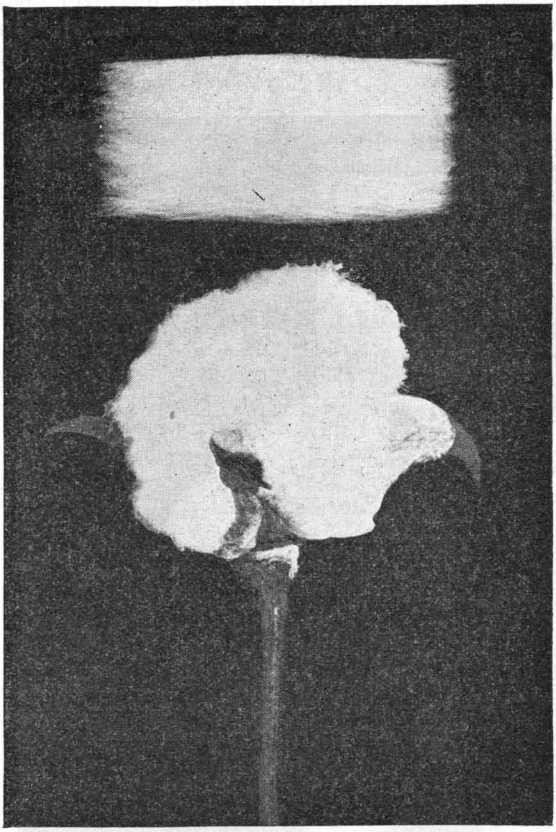

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The universal standards for grade of American upland cotton recognize five color classifications which are put up in physical form, Extra White, Blue Stained, White, Yellow Tinged, and Yellow Stained, and three descriptive classes, Gray, Spotted, and Light Stained. Within each class there is a wide range of color variation, as in the white grades in which the color varies from the very light creamy cottons of Good Middling and above to the dark spotted cottons included in Good Ordinary.

In order to make a preliminary survey that would reveal something about these different colors, what caused them, how stable they are, and other characteristics, a study was undertaken in the 1930 season on cotton grown at the South Carolina Experiment Station at Clemson College. The study was limited to the factor of exposure.

The method of procedure was: In September, when the cotton was opening profusely, a great many newly opened bolls were tagged for future consideration. A certain number of these tagged bolls were picked on the date of tagging and at regular intervals for several days,

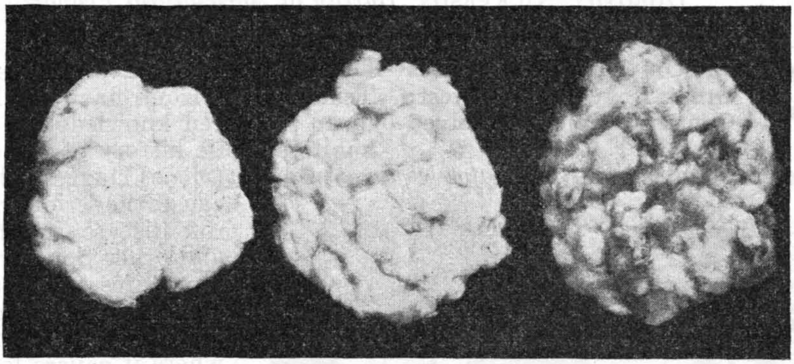

FIGURE 32.—Exposure alone causes these differences. The cottons were ready to pick by mid-September. The samples illustrated were picked during the latter part of September, the middle of December, and the first of March

then daily for approximately two weeks, and weekly thereafter as long as there were tagged bolls remaining on the stalks. This provided a series of the same cotton, grown in the same field, under identical conditions. (Fig. 32.)

Definite Color Trend Shown

The samples were small, hand picked, and hand ginned, yet they provided excellent material for a study of the actual fiber color change. Although they are not entirely representative of grade since they contain so little trash, yet the grade given to them by Government classers lowers regularly from the first to the last of the season and follows the same trend that would take place in the classification of commercial samples. During the first two weeks after tagging, all of the samples graded Strict Good or Good Middling White or Spotted. The last sample to grade in the White grades was picked on the eighteenth day after tagging. From that time on the samples graded progressively through Good Middling Spotted, Good Middling Gray, Strict Middling Spotted and Strict Middling Gray, Good Middling Blue, Middling Spotted, Strict Middling Blue, Strict Low and Low Middling Spotted, and finally became so low in color that they could not be

graded against the standards. Measurements of the color of these cottons show a very definite trend from light, somewhat creamy cottons of the high White grades down through the Grays to the low-grade Blue cottons. The spots which caused some of the higher grades to fall into Spotted classifications seemed to be of different origin from those of the low grades, the general background color of the low grades being gray or blue even though they were called Spotted cottons. The measurements showed that the cottons picked after the middle of January were so low that there are no equivalent grades for them.

This study covers only one eastern cotton under weather conditions of 1930–31. Cottons from several sections of the Cotton Belt were studied in 1931, with many additional laboratory tests made upon them in order to discover correlated factors; that is, as the grade deteriorates by exposure, what other changes in characteristics occur that affect the spinning utility of the cotton.

It is a significant fact that exposure in the field for only two or three weeks after the bolls first open will lower the grade of the cotton.

DOROTHY NICKERSON, *Bureau of Agricultural Economics.*

COTTON Root Rot Causes Great Loss in Southwest; Control Problem Unsolved

During recent years, studies in Texas and Arizona have resulted in an increased knowledge of the habits and life history of the cotton root-rot fungus (*Phymatotrichum omnivorum* (Shear) Duggar) which causes the serious root-rot disease in these and other Southwestern States. (Fig. 33.) The disease is most prevalent in Texas, where it causes losses estimated at $100,000,000 annually. It is also responsible for serious losses in parts of Oklahoma, Arkansas, New Mexico, Arizona, southern California, and northern Mexico.

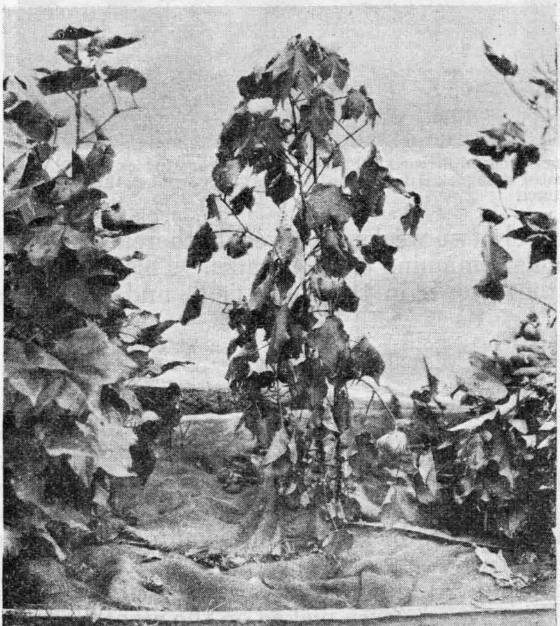

FIGURE 33.—Characteristic appearance of a cotton plant dying from effects of the root-rot fungus

The disease attacks not only cotton but alfalfa and many important field crops, vegetables, fruit and shade trees, berries, and ornamental plants. (Fig. 34.) Texas investigators have listed 274 species of cultivated plants and about 350 noncultivated species which serve as hosts of the fungus. The root-rot fungus is undoubtedly native to most of the areas where it occurs, as it is found on wild plants remote from cultivation, and

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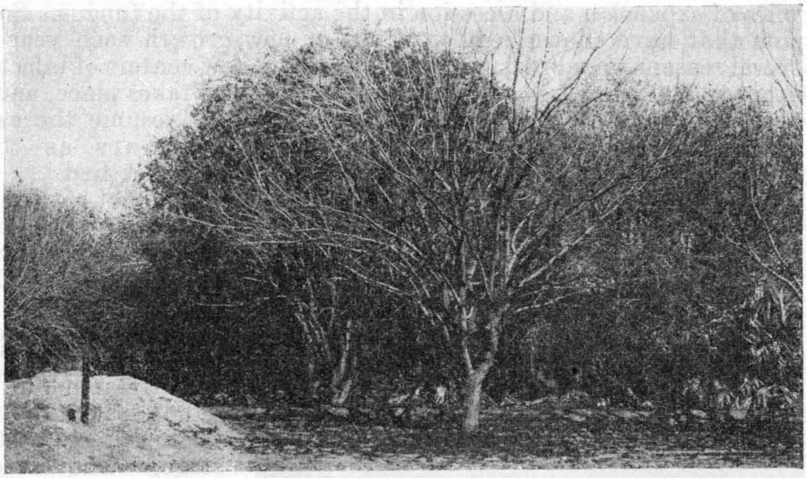

FIGURE 34.—A pistache tree killed by the cotton root-rot fungus near Indio, Calif.

often appears in the first crops planted on virgin soils. There is no evidence that the disease is disseminated by such agencies as farm implements, animals, wind, or irrigation water, but it may be transmitted by the transfer of infected plants or sclerotia. It usually persists in the same areas for many years.

The growth of the fungus is entirely subterranean except when it is producing fruiting bodies, and all of the direct injury is to the roots of plants. The fungus spreads by sending out numerous fine filaments, which advance among the soil particles. Some of these develop into strands which convey food materials for the extension of growth. (Fig. 35.)

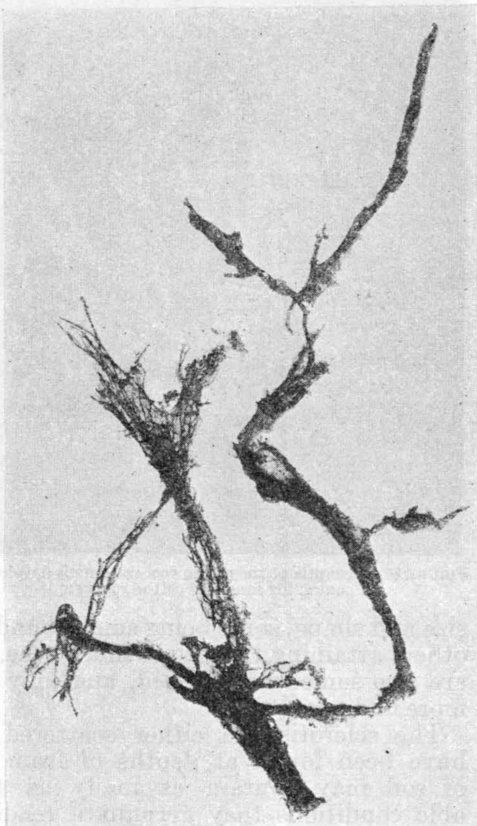

FIGURE 35.—A rhizomorphic type of strand of the cotton root-rot fungus obtained from the soil beneath a spore mat (× 6)

Irregular Cycles of Activity

Maps prepared over a period of several successive years from careful measurement of root-rot spots in cotton fields show irregular

cycles of expansion and recession in the activity of the fungus. Some spots that have shown regular bands of new growth each year for several seasons may break up and leave only a few centers of infection within the invaded area. From these new growth takes place, and as expansion continues in later years, the spots may resume the same contours as they formerly had.

FIGURE 36.—Sclerotia of the cotton root-rot fungus developing in jars containing sand and cotton roots (× 1½)

The root-rot fungus is known to have three stages of development in its life history. These are the Ozonium or vegetative stage, the Phymatotrichum or conidial stage, and the sclerotial or resting stage. The conidial stage appears as cushions or mats of spores on the surface of the ground, under special conditions of shade and moisture. The mats are white in color when first developed, but turn buff as they grow older, and in the later stages break down into a brownish powdery mass of conidia. The spores do not germinate readily, and there is no evidence that they can cause infection. The sclerotial stage develops in the soil in the form of swellings or nodular enlargements of the strands. (Fig. 36.) The sclerotia vary in size and shape, some being small rounded bodies like mustard seed and others attaining the size of small peas. Chains or clusters of sclerotia are also sometimes formed, and may be three-fourths of an inch or more in diameter.

The sclerotia are either scattered or grouped in the soil, and have been found at depths of from 3 to 92 inches. A cubic foot of soil may contain as many as 4,000 to 5,000. Under favorable conditions they germinate readily and are capable of infecting plants. Sclerotia were found to be viable after being kept in soil under laboratory conditions for two and one-half years, and it is indicated that they may live at least that long under

some conditions in the field. They are readily killed by disinfectants and by exposure to drying, but live for a long period in moist soil or submerged in water.

No Entirely Satisfactory Control Measure

None of the control methods that have been tried are entirely satisfactory. Clean fallowing, repeated applications of barnyard manure over a period of several years, and subsoiling combined with rotation with nonsusceptible crops were effective in reducing the extent of the disease in some experiments. In some sandy soils it has been demonstrated that disinfectants such as formaldehyde, when applied by check flooding or by injection methods, were effective in destroying the fungus in both its vegetative and sclerotial stages. Barriers in the form of open trenches, sheet metal, or mixtures of soil with fuel oil or sulphur were found to limit the spread of the fungus. Applications of commercial fertilizers hastened the maturity of the cotton crop and increased the yield in some infested areas, but did not greatly influence the extent of infestation. Repeated attempts have been made to breed a strain or variety of cotton that would be resistant to root rot, but the results have been rather discouraging. More promising results were obtained in testing for resistance some of the fruit trees and ornamental plants.

C. J. King, *Bureau of Plant Industry.*

Cream to Whip Readily Must Be of the Proper Temperature and Age

Whipped cream is generally considered an appetizing delicacy only, but it is a valuable food as well. No other dairy product is used so extensively as a basis for desserts or to garnish them. Likewise, in all probability, no other dairy product gives more trouble to both dealer and customer. The housewife often is disappointed when, after she plans the meal, the cream fails to whip. This means complaints to the dealer supplying the cream, who in turn must go to the trouble of finding out why the cream failed to whip and must attempt to satisfy the customer.

When cream fails to whip, the first thought is that it does not contain a sufficiently high percentage of butterfat. This is rarely the case nowadays, for practically all the dairies are supplying their trade with whipping cream containing 30 per cent or more of butterfat. Cream with this percentage of butterfat will give a satisfactory whip if properly handled.

It is true that raw cream gives a slightly better whip than does pasteurized cream of the same fat content. The difference, however, is not great. It is well to consider the source of the cream, and if there is any doubt as to its sanitary quality, pasteurized cream should be selected because of the added factor of safety to human health.

Most of the trouble with whipping cream could be avoided if the importance of temperature were more generally realized. There is no other single factor which causes as much trouble with whipping as the temperature at the time of whipping. For success in whipping, the cream should be whipped at a temperature below 50° F. Many times, even when the cream has been stored at a low temperature, it is brought

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into a warm room, poured into a warm container, and then whipped with a warm beater. Under such conditions the temperature of the cream may rise several degrees, and its whipping ability often becomes so greatly impaired that it fails to whip. If the housewife will remember the importance of temperature during the process and have the cream cold and all utensils chilled, she will avoid many disappointments, and there will be fewer complaints received by dairies supplying whipping cream.

The Age Factor

When cream is separated for home use, it is well to bear in mind that age is an important factor in whipping cream. Cream which fails to whip when fresh often develops into an excellent whipping cream when aged at a temperature sufficiently low (45° F.) to prevent the rapid formation of acidity. Care must be used, however, in aging cream. If the temperature exceeds 50°, the cream may become sour before the desired effect of aging takes place. It may also develop off flavors unless it is aged under ideal conditions free from odors.

The time required for aging varies with the butterfat content. However, if the cream contains 30 per cent or more butterfat, the greatest effect will take place during the first 12 hours of aging, and at approximately 36 hours the maximum ability to whip is approached.

Therefore, in selecting a whipping cream it is important to select one that is at least 12 hours of age and contains 30 per cent or more of butterfat. Then if the cream is properly handled and kept at a temperature of 45° F. or lower before and during the whipping process, most whipping-cream troubles and disappointments will be over.

C. J. Babcock, *Bureau of Dairy Industry.*

DAIRY Bulls from Proved Sires Increase Output of Daughters

Purebred Holstein-Friesian and Jersey bulls that have shown the ability to transmit to their daughters the capacity for uniformly high milk and butterfat production have been constantly in service at the experimental farm of the Bureau of Dairy Industry at Beltsville, Md. Sons of these proved sires have been placed with dairy farmers and institutions in Maryland and Virginia for use as herd sires on condition that the farmers raise all daughters of these bulls and furnish satisfactory production records on their herds. Sufficient data on the productive ability of the daughters of some of these bulls are now available to determine their transmitting ability.

Of the bulls used in this cooperative work, 14 are sons of 4 unrelated, proved Holstein-Friesian sires, and 12 are sons of 5 proved Jersey sires. These 26 sons were mated both to purebred and grade cows and have sired 257 daughters. The Holsteins have 181 daughters and the Jerseys 76 daughters with completed records. Most of the daughters and dams were tested through dairy herd-improvement associations and were handled under average farm conditions. Both daughters' and dams' records in Tables 2 and 3 have been calculated to maturity by applying the factors prepared in the Bureau of Dairy Industry. All of the daughters' records were made during the first lactation period, while those of the dams were made during various lactation periods.

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The average production records of the daughters and of the dams of the daughters are shown in Tables 2 and 3. Only those sires having three or more daughters are considered in this tabulation.

TABLE 2.—*Average production records of daughters of 14 Holstein-Friesian bulls each having three or more daughters, compared with the records of the dams of the daughters*

Sire No.	Daughters and dams	Daughters			Dams of daughters			Increase or decrease of daughters over dams	
		Milk	Butterfat		Milk	Butterfat		Milk	Butterfat
	Number	*Pounds*	*Per cent*	*Pounds*	*Pounds*	*Per cent*	*Pounds*	*Pounds*	*Pounds*
315	4	11,053	3.38	373.7	7,807	3.74	292.2	3,246	81.5
318	13	10,522	3.76	396.1	7,447	3.90	291.0	3,075	105.1
323-R	54	14,022	3.26	456.7	11,806	--------	--------	2,216	--------
324-R	6	11,908	3.66	435.8	8,662	3.89	337.7	3,246	98.1
329-R	20	9,785	3.31	323.9	7,892	3.54	279.4	1,893	44.5
331-R	3	11,920	3.60	431.0	11,159	3.57	398.0	761	33.0
335-R	32	15,710	3.33	523.5	12,584	--------	--------	3,126	--------
343-R	11	9,780	3.62	354.0	7,751	3.86	299.0	2,029	55.0
344-R	5	9,414	3.80	358.0	7,294	4.18	305.0	2,120	53.0
355-R	5	11,042	3.22	356.0	9,191	3.56	327.0	1,851	29.0
363-R	10	8,968	3.97	356.0	7,485	3.57	267.0	1,483	89.0
354-P	5	8,656	3.50	303.0	9,647	3.51	339.0	[1] −991	[1] −36.0
358-P	8	14,456	3.46	501.0	13,345	--------	--------	1,111	--------
366-P	5	10,378	3.31	344.0	10,170	3.38	344.0	208	--------
181 daughters and dams average		12,465	--------	--------	10,273	--------	--------	2,192	--------
87 daughters and dams average		10,122	3.55	359.6	8,194	3.69	302.1	1,928	57.5
181 daughters average		12,465	3.40	423.8	--------	--------	--------	--------	--------

[1] Minus sign indicates decrease.

TABLE 3.—*Average production records of daughters of 12 Jersey bulls each having three or more daughters, compared with the records of the dams of the daughters*

Sire No.	Daughters and dams	Daughters			Dams of daughters			Increase or decrease of daughters over dams	
		Milk	Butterfat		Milk	Butterfat		Milk	Butterfat
	Number	*Pounds*	*Per cent*	*Pounds*	*Pounds*	*Per cent*	*Pounds*	*Pounds*	*Pounds*
517-M	10	10,271	5.13	527.0	9,543	4.84	462.0	728.0	65.0
527-M	5	5,962	5.19	309.2	5,239	4.96	259.8	723.0	49.4
537-M	3	7,226	5.52	399.0	6,015	5.07	305.3	1,211.0	94.0
544-M	8	8,348	4.90	410.0	10,152	3.98	404.0	[1] −1,804.0	6.0
563-M	7	6,354	4.92	312.0	5,873	4.76	279.0	481.0	33.0
579-M	5	5,397	5.08	275.0	5,496	4.45	244.0	[1] −99.0	31.0
538-K	8	8,869	4.39	389.5	6,745	4.49	301.0	2,124.0	88.5
548-K	7	8,223	5.01	412.0	6,914	5.17	357.0	1,309.0	55.0
549-K	5	6,311	4.79	302.2	6,761	4.78	323.0	[1] −451.0	[1] −21.0
560-S	7	6,811	5.49	373.0	4,957	5.34	264.7	1,854.0	109.1
577-T. R	5	6,911	5.68	392.4	5,544	5.37	298.0	1,367.0	94.4
540-VL'F	6	8,996	5.10	459.0	7,702	4.77	367.3	1,294.0	92.0
76 daughters and dams average		7,746	5.04	390.7	7,030	4.74	333.3	716.5	57.4

[1] Minus sign indicates decrease.

Yearly Production Averages

The average yearly production of the 181 Holstein daughters when calculated to a mature basis is 12,465 pounds of milk, as compared with 10,273 pounds of milk for their dams, an average increase of 2,192 pounds.

The average yearly production of the 87 daughters and dams having both milk and butterfat records is 10,122 pounds of milk, and 359.6 pounds of butterfat, as compared with 8,194 pounds of milk, and 302.1 pounds of butterfat for their dams, an average increase of 1,928 pounds of milk, and 57.5 pounds of butterfat.

The average yearly production of the 76 Jersey daughters when calculated to a mature basis is 7,746 pounds of milk, and 390.7 pounds of butterfat, as compared with 7,030 pounds of milk and 333.3 pounds of butterfat for their dams, an average increase of 716.5 pounds of milk and 57.4 pounds of butterfat.

When the individual milk-production records of the 181 Holstein daughters were compared with the records of their dams it was found that 150 exceeded their dams in milk. Of the 87 daughters and dams having both milk and butterfat records, 68 daughters exceeded their dams in milk, 71 in pounds of butterfat, and 33 in per cent of butterfat.

When similar comparisons were made of the 76 Jersey daughters and their dams, 48 daughters exceeded their dams in milk, 58 in pounds of butterfat and 50 in per cent of butterfat.

It will be noted in Tables 2 and 3 that 22 of the 26 sires have daughters that show an increase in average milk production over that of their dams, and that 24 of these sires have daughters that show an increase in both milk and butterfat production.

The value to dairy farmers of this increased production based on the average price of milk for 1930, paid to producers in the region where these bulls were used, would amount to $70.14 per cow per year for the Holstein group, and $31.17 per cow per year for the Jersey group. The total value of the increase in production for two groups is $15,064.26 per year.

While the increase in production derived from the daughters of sons of proved sires commands the dairy farmer's attention, it also reveals the fact that the chance of obtaining unprofitable daughters is greatly lessened when sons of proved sires are used.

C. J. STAUBER, *Bureau of Dairy Industry.*

DAIRY Cows Fed More Economically If Grain Is Properly Apportioned

The proper and economical feeding of the dairy cow consists in providing all the feed nutrients she requires, not only in the form best adapted for her use but also at the lowest cost and without waste. This requires that she be fed all or nearly all the good roughage she will eat and in addition, except for a few weeks immediately after calving, enough grain of suitable protein content to meet her requirements for milk production and for maintaining her body with no loss of weight and with only a small gain. The nutrients needed to meet these requirements will be supplied with a fair degree of accuracy if the feeder follows one of the commonly used feeding standards.

When the dairy cow is not on pasture, the usual method of feeding is to give her all the roughage she will consume in the form of hay, or

Yearly Production Averages

The average yearly production of the 181 Holstein daughters when calculated to a mature basis is 12,465 pounds of milk, as compared with 10,273 pounds of milk for their dams, an average increase of 2,192 pounds.

The average yearly production of the 87 daughters and dams having both milk and butterfat records is 10,122 pounds of milk, and 359.6 pounds of butterfat, as compared with 8,194 pounds of milk, and 302.1 pounds of butterfat for their dams, an average increase of 1,928 pounds of milk, and 57.5 pounds of butterfat.

The average yearly production of the 76 Jersey daughters when calculated to a mature basis is 7,746 pounds of milk, and 390.7 pounds of butterfat, as compared with 7,030 pounds of milk and 333.3 pounds of butterfat for their dams, an average increase of 716.5 pounds of milk and 57.4 pounds of butterfat.

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When the dairy cow is not on pasture, the usual method of feeding is to give her all the roughage she will consume in the form of hay, or

hay and silage, or hay and roots, together with 1 pound of grain for each 3 or 4 pounds of milk she produces, depending upon the richness of the milk and somewhat upon the quality of the roughage. This usual method of apportioning grain is inaccurate for two reasons: (1) Because cows will get enough nutrients from good roughage alone to provide for the maintenance of their bodies as well as for the production of a certain quantity of milk; and (2) because 1 pound of grain does not contain sufficient nutrients to produce as much as 3 pounds of milk. The use of this method, therefore, results in the feeding of too much grain to low producers and the feeding of too little grain to high producers. The low producers get fat because they are overfed. The high producers not only get thin as a result of underfeeding, but their milk production declines rapidly to a point at which the nutrients provided are sufficient for the milk produced.

Feeding Tests at Beltsville, Md.

In order to develop a method of accurately apportioning grain to dairy cows, investigations were undertaken at the United States Dairy Experiment Station of the Bureau of Dairy Industry at Beltsville, Md. It was found necessary: (1) To determine how much hay cows of different breeds and sizes would consume when given all they would eat along with a definite quantity of silage; (2) to calculate the pounds of milk for which this quantity of hay and silage would provide nutrients, at the same time maintaining the weight of the cow; and (3) to determine by means of actual feeding trials how much grain is required to provide nutrients for the additional milk produced, and to keep the cows gaining slightly in weight.

The data on roughage consumption were obtained for Holstein and Jersey cows fed 3 pounds of silage per day per 100 pounds live weight, and in addition, all the No. 2 or No. 3 alfalfa hay they would eat. It was found that:

(1) Large cows ate more roughage than small cows.

(2) Both large and small cows ate roughage in excess of their maintenance requirements.

(3) The extra roughage eaten by large cows, above maintenance requirements, was more than the extra roughage eaten by small cows.

(4) Jerseys and Holsteins of the same size ate about the same quantity of roughage.

Calculating the maintenance requirements on the basis of the Savage feeding standard, it was found that the small cows ate about 8 pounds of hay a day more than they required for maintenance, while the large cows ate about 10 pounds of hay more than the quantity required for maintenance. It was also estimated from the Savage feeding standard that the nutrients in 8 pounds of hay would be ample for the production of 10 pounds of Jersey milk, while 10 pounds of hay would provide nutrients for at least 16 pounds of Holstein milk.

It is assumed, therefore, that if cows are fed silage and all the No. 2 alfalfa hay they will eat, only those producing more than the quantities specified will require grain. For the production of milk above these quantities, 0.6 pound of a grain mixture in which one-half of the ingredients are of a bulky nature, as ground oats or wheat bran, will provide the nutrients required for 1 pound of average Jersey milk on the basis of the feeding standard, while 0.4 pound will suffice for 1 pound of average Holstein milk.

Method Tried for Three Winters

This method of feeding was given a practical trial at the Beltsville experiment farm for three winters. Altogether 40 Jersey cows were fed for a total of 162 cow-months; and 31 Holsteins for a total of 83 cow-months. The quantity of grain fed was adjusted on the first of each month according to the quantity of milk being produced at that time. The hay was mostly No. 2 alfalfa, and the corn silage was of average quality. The grain mixture was composed for the most part of 100 pounds of hominy feed, 100 pounds of ground oats, 100 pounds of wheat bran, 50 pounds of cottonseed meal, 50 pounds of linseed meal, and 4 pounds of salt. This mixture analyzed on the average about 19 per cent total protein. The efficiency of this method was measured by the rate of decline in milk production and by the condition of flesh in which the cows were maintained.

In these feeding trials, the Jersey cows averaged 970 pounds in weight and gave 22.5 pounds of milk a day testing 5.25 per cent; the Holstein cows averaged 1,210 pounds in weight and gave 36.5 pounds of milk testing 3.4 per cent. From the first to the last of each month, the Jerseys declined in milk production an average of 9.3 per cent, and gained 5.2 pounds in body weight; while the Holsteins declined an average of 8.5 per cent and gained 6.9 pounds in body weight.

The average daily ration for the Jerseys was 7.3 pounds grain, 12.7 pounds hay, and 27.6 pounds silage; that for the Holsteins was 8.5 pounds grain, 17 pounds hay, and 35.4 pounds silage. Based on average feed analysis, the Jersey cows ate 1.9 per cent more nutrients than required by the Savage standard, while the Holsteins ate 4.6 per cent more. The Jerseys consumed 20.2 per cent more protein than called for by the Savage standard, while the Holsteins consumed 17.5 per cent more. Perhaps a grain mixture containing a little smaller percentage of protein would have been just as satisfactory.

This method of feeding proved satisfactory since in general there was a small gain in live weight and the decline in milk production was no larger than normal.

Table 4 shows the average daily quantities of grain actually apportioned to cows giving different quantities of milk, compared with the quantities of grain that would have been fed by the common method of apportioning grain at the rate of 1 pound for each 3 pounds of Jersey milk or each 4 pounds of Holstein milk produced.

TABLE 4.—*A comparison of the quantities of grain actually fed to Jersey and Holstein cows with the quantities called for by common feeding practices*

Jersey cows				Holstein cows			
Milk produced daily		Grain apportioned daily		Milk produced daily		Grain apportioned daily	
Range	Average	Quantities actually fed	Quantities called for by common method	Range	Average	Quantities actually fed	Quantities called for by common method
Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
40.1-41.2	40.7	17.6	13.6	60.1-74.2	66.9	22.5	16.7
30.1-40.0	34.3	13.4	11.4	50.1-60.0	52.3	14.7	13.1
20.1-30.0	24.8	8.4	8.3	40.1-50.0	45.1	11.6	11.3
10.1-20.0	15.1	3.1	5.0	30.1-40.0	34.4	7.6	8.6
10.0 or less	8.1	.0	2.7	20.1-30.0	24.0	3.2	6.0
				20.0 or less	15.3	.4	3.8

When the cows were grouped by breeds according to the quantity of milk they were producing, it was found that except for a few of the highest producers, most of which had been fresh only a short time, the cows ate enough nutrients to meet their requirements, and the few high producers failed by only a small margin; the highest producers lost some weight, while the remainder of the cows in most cases made satisfactory gains in weight; the declines in milk were about such as would be normally expected.

Waste is Prevented

This new system of apportioning grain appeared, under the conditions of the experiment, to provide the nutrients required without waste, for both high-producing and low-producing Jersey and Holstein cows in all stages of lactation. This method may be applied in a like manner to other dairy breeds. To obtain comparable results it appears that, when roughages similar in kind and quality are fed, Guernseys should receive grain at the rate of 0.55 pound daily for each pound of milk produced above 12 pounds, while Ayrshires and Brown Swiss should receive 0.45 pound of grain daily for each pound of milk produced above 14 pounds.

This method is not presented with the idea that it will apply to all conditions. In general, it does seem to apply where cows are fed from 2 to 3 pounds of fair-to-good quality of silage daily per 100 pounds live weight, along with all they will consume of No. 2 or No. 3 alfalfa or soybean hay, No. 1 or No. 2 clover and timothy, or other mixed legume and nonlegume hay, or No. 1 timothy or other grass hay of the highest quality. It is necessary, however, to adjust the percentage of protein in the grain mixture so that it will properly supplement the kind of roughages fed.

Roughages fed of lower quality than those indicated will provide less digestible nutrients above maintenance requirements for milk production, and more grain will be required. Roughages of higher quality than those indicated will make available more digestible nutrients above maintenance requirements for milk production, and less grain will be required. Feeding trials at department and State experiment stations show that cows receiving all the highest-quality legume hay they will eat (particularly alfalfa), either with or without silage, will consume sufficient roughages to provide nutrients for considerably larger quantities of milk than were obtained from the above tests. The Bureau of Dairy Industry now has feeding trials in progress to ascertain what quantities of high-quality legume hays dairy cows will consume, in order to determine how large a production of milk such roughage will provide nutrients for, in addition to the cows' maintenance requirements.

J. B. Shepherd, *Bureau of Dairy Industry.*

DAIRY Herd-Improvement Associations Complete Twenty-Five Years' Work

A dairy herd-improvement association is an organization of dairy farmers who cooperatively employ a tester to determine the amount of milk and butterfat produced by every cow owned by the members and to compute the cost of production. The records thus obtained serve as a basis for determining the kinds and amounts of feed to be

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fed for economical production and to indicate the cows that do not respond profitably to proper feeding and care. Attention is also given to the rearing of young stock and the selection of herd sires. Members of many associations also cooperate in selling their dairy products and in buying farm supplies.

The first association in the United States was organized in Newaygo County, Mich., in 1905, and began work in January, 1906. According to the census of 1900 the average production of butterfat per cow in the United States was 145 pounds per year. At the completion of one year's operation the Newaygo County Association found that the 239 cows completing a year's record averaged 215 pounds of butterfat per cow, or 70 pounds above the average for all cows.

This was very encouraging and the keeping of dairy records gradually spread to other parts of Michigan and to other States as well. By 1910 there were 64 associations in 11 States. In 1915 the work covered 25 States with 346 associations. In 1925 there were 777 associations in active operation, and on January 1, 1931, there were 1,112 associations in 45 States with more than half a million cows on test.

Not only had the number of associations increased, but the average production of the cows on test had increased.

Compared to the first year's average of 215 pounds in the Newaygo County Association the average of 452 associations in 1920 showed a gain of 32 pounds of butterfat per cow. In 1925 the average was 284 pounds. In 1930 the average for more than half a million cows on test was 302 pounds per cow, a gain of 87 pounds during the 25 years of record keeping.

Associations Have Wide Influence

Although the number of cows on test represents only a small percentage of all dairy cows in the United States, the influence of the dairy herd-improvement association program seems to have extended beyond the membership of the associations, for the general average of all cows has been raised from 145 pounds of butterfat per cow in 1900 to 180 pounds in 1930.

When the association work began it consisted chiefly of furnishing records as a basis for the elimination of low-producing cows. As the work progressed, other factors for herd improvement were added—such as feeding according to production, making a better and more economical selection of feeds, giving more attention to breeding dates, and finally making it possible to check up on the herd sire through the production records of his daughters.

The member of a dairy herd-improvement association who takes advantage of all the factors that are now available in association work has his enterprise on a sound business basis.

It can not be said that the dairy herd-improvement associations are entirely responsible for all of the general improvement of our dairy cows, but there is no doubt that the associations have contributed to this improvement, directly and indirectly, more than any other single factor.

The general plan of keeping feed and production records of dairy cows, cooperatively, originated in Denmark some 10 years previous to its introduction into the United States. At the present time there

are dairy herd-improvement associations in nearly every dairy country in the world. Denmark has 38.5 per cent of her cows on test, Finland 17.4 per cent, New Zealand 20 per cent, Scotland 18 per cent, and Canada 2.5 per cent. The United States with 23,000,000 cows has only 2.2 per cent on test.

However, if the average production of all the cows in the United States were equal to that of the 2.2 per cent now being tested in dairy-herd associations, it would require only about 14,000,000 cows to produce as much milk and butterfat as the 23,000,000 are now producing.

J. E. DORMAN, *Bureau of Dairy Industry.*

DAIRY Herd-Improvement Records Show Value of Increased Output Per Cow A study of the yearly individual records of 233,200 cows on test in dairy herd-improvement associations for the testing year ended in 1930 shows that as production of milk per cow advanced from the lowest-producing groups to the higher-producing groups, the profits per cow increased at a very rapid rate.

Table 5 shows the comparative cost and returns of increaed production for the groups of cows whose average yearly milk production per cow was 4,000, 8,000, 12,000, and 16,000 pounds.

TABLE 5.—*Relation of milk production to other factors*

Group No.	Milk production per cow	Feed cost per 100 pounds of milk	Yearly feed cost per cow	Yearly income over feed cost per cow	Returns per dollar spent for feed
	Pounds	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1	4,000	1.47	60.00	55.00	1.92
2	8,000	.99	79.00	115.00	2.46
3	12,000	.84	101.00	167.00	2.65
4	16,000	.83	132.00	239.00	2.81

The average feed cost for the group of cows that produced 4,000 pounds of milk per cow in one year's time was $1.47 per 100 pounds of milk, while the feed cost for those that produced 8,000 pounds was 99 cents; for those that produced 12,000 pounds it was 84 cents, and for those that produced 16,000 pounds it was only 83 cents per 100 pounds of milk. In other words, as production per cow advanced from 4,000 pounds of milk to 16,000 pounds of milk, the cost of feed per 100 pounds of milk was reduced almost one-half. These figures give some idea of what may be saved in feed alone by increasing the production per cow. The dairy herd-improvement association figures do not give labor costs and overhead expenses, but the cost of labor and the expenses of overhead should not be much greater for the high-producing cow than for her low-producing sister.

Feed Costs Per Cow

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Feed Costs Per Cow

While the feed cost per 100 pounds of milk went down from group to group as production increased, the yearly feed cost per cow went the

other way. For the group whose average milk production was 4,000 pounds the yearly feed cost per cow was $60; for the group averaging 8,000 pounds the average feed cost was $79; for the group producing 12,000 pounds it was $101, and for the group producing 16,000 pounds it was $132. These figures indicate that a cow producing 16,000 pounds of milk in a year eats more than twice as much feed as the cow that produces 4,000 pounds. Yet her production is so much greater that in spite of the increased cost of feed she returns a much larger yearly income over cost of feed.

The yearly income over cost of feed for the cows whose average milk production was 4,000 pounds was $55 per cow. The group having an average milk production of 8,000 pounds returned $115 in income over cost of feed. The group whose average production was 12,000 pounds returned $167 in income over cost of feed, while the group whose average milk production was 16,000 pounds returned $239 a year per cow in income over cost of feed. As it is usually considered that the feed cost of keeping the average cow a year is just about equal to the cost of labor and overhead, we may conclude that the cows having an average milk production of 4,000 pounds a year per cow just about paid for their feed, labor, and cost of overhead. In other words, they just about broke even. If that is true, it is safe to assert that all cows falling below the yearly production of 4,000 pounds of milk per cow in these dairy herd-improvement associations were actually carried at a loss and even in the dairy herd-improvement associations there are still many cows that fall below that low level of production.

Returns Per Dollar Spent for Feed

Figures showing the returns per dollar spent for feed are quite significant. Table 5 shows that cows producing an average of 4,000 pounds of milk a year per cow returned $1.92 per dollar spent for feed, while those that produced 16,000 pounds of milk per cow returned $2.81 per dollar spent for feed. Low-producing dairy cows are not a good market for the feed grown on dairy farms, but high-producing dairy cows always constitute a good market for home-grown feeds.

Every dairyman should manage in some way to get production, feed cost, and income records of each cow in his dairy herd. He will find it profitable to study these individual cow records because they enable him to determine which cows should be kept and which should be discarded. Of all the figures in the table he will be most interested in the yearly income over cost of feed per cow. That figure means much more to him than the yearly cost of feed per cow or the returns per dollar spent for feed, because there can certainly be no profit until the returns pay for feed, for labor, and for overhead. To be sure, there are returns from the dairy herd other than those obtained from the sale of dairy products. For example, a certain value must be allowed for the manure and for the calf, but it costs something to haul the manure to the field and it costs something either to veal the calf or to raise it to production age. Therefore the dairyman would do well to step the production of his dairy herd up to the point at which the income from the sale of dairy products will pay all costs and leave a fair net profit.

J. C. McDowell, *Bureau of Dairy Industry.*

DATE Industry of U. S. is an Example of New, Noncompetitive Crop Date palms have been growing in Florida, Texas, and California ever since the Spanish pioneers settled those regions, but unfortunately all the early plantings were made by sowing seeds. About half of the seedlings were male palms, and only a few of the bearing palms yielded fruit of high quality. Nevertheless, seedling date palms made so good a showing in California, Arizona, and Florida that active interest in the date as a new fruit crop began to develop early in the eighties of the last century.

In consequence of this interest the United States Department of Agriculture secured by correspondence offshoots of Old World date palms from Algeria, Egypt, and Arabia in 1889 and 1890 and sent them to California, Arizona, and New Mexico for testing in cooperation with the agricultural experiment stations of those States. Unfortunately these offshoots proved to be mere seedlings, mostly of little value. However, some of them made so rapid a growth and bore such abundant crops of dates that interest in them as a new fruit tree became still keener.

In 1900 a specialist of the United States Department of Agriculture went to the Algerian Sahara and selected several hundred offshoots of the choicest varieties grown there. These offshoots included a score of varieties, among them the famous Deglet Noor date, then and now the most highly esteemed date in the European markets. Most of these offshoots were planted in the Cooperative Date Garden at Tempe, Ariz., and a few dozen were sent to California in cooperation with the California State Experiment Station and with private growers. In the years immediately following (continuing to the present time) the Department of Agriculture made additional importations from the best Old World date regions, especially Mesopotamia, Persia, Beluchistan, Arabia, Egypt, Tunis, and Algeria. A cooperative date garden was established in California in 1904 and later another in Texas. Soon scores of the best date varieties of the Old World were growing vigorously in the hot, dry irrigated valleys of the southwestern United States.

Climatic Requirements Indicated

A careful study was made in the Old World and in the New to determine as nearly as possible the life-history requirements and physiological limiting factors of the date palm. The findings were given wide publicity in order to prevent, in so far as possible, the loss of time and money that would result from planting date varieties in soils or under climatic conditions unsuited to them. These studies showed that the date palm required such a hot, dry climate to mature its fruit that large-scale commercial date culture was possible only in the hot irrigated valleys of southern California, southern Arizona, extreme southern Nevada, and southern Texas. (Fig. 37.)

It soon became evident that very few of the many choice Old World varieties were adapted to culture in this country, and the promising ones needed prolonged and very careful study before they were sufficiently understood to justify being grown on a commercial scale.

About 10 years after the first offshoots had been planted a few varieties began to show decided promise of succeeding here. The Deglet Noor was one of these, but good fruit of this variety was not produced in commercial quantities until the twelfth year after the offshoots had

been planted. New methods of curing Deglet Noor dates were developed by the date specialists of the Arizona Agricultural Experiment Station and the United States Department of Agriculture, and these enabled American date growers to produce fruit that equaled or even surpassed that grown in the Old World. Thereupon a farmers' cooperative date association was formed, with the assistance of the Department of Agriculture, to import offshoots of this and other varieties, and interest in commercial date culture grew very rapidly. Stimulated by the active interest in date culture, a private nursery company made large importations of date offshoots from Mesopotamia, Arabia, and several other date-growing countries in the Old World from 1912 to 1914.

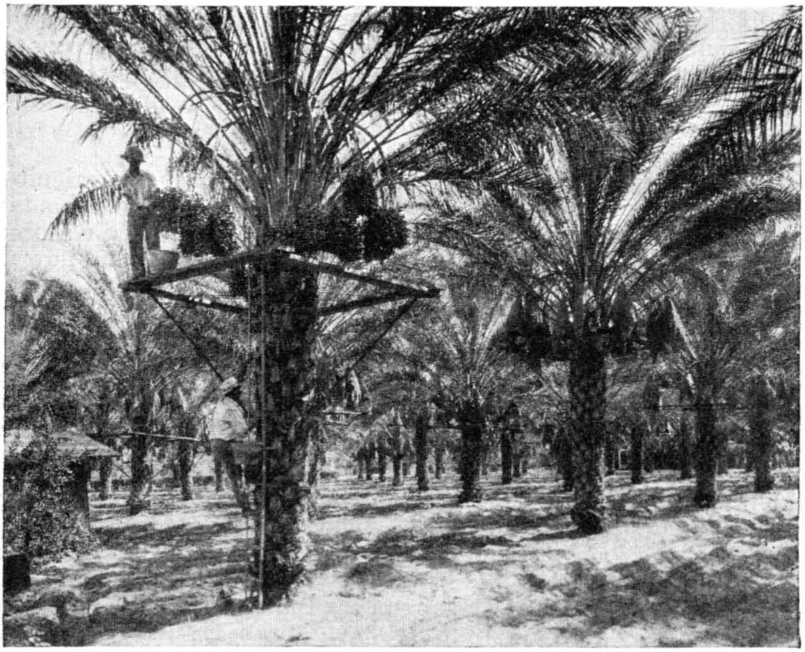

FIGURE 37.—Fourteen-year-old Deglet Noor date palms in full fruit in a private garden near Indio, Calif., October, 1930. Adjustable picking platforms are attached to the palms, and on most of the bunches the fruit is protected by burlap coverings

Only a Few Varieties Commercially Established

Little by little one date variety after another was studied thoroughly enough so that its culture could be undertaken with reasonable assurance of success. In this pioneer work the contributions made by experts in charge of private date-packing houses were of decisive importance. In spite of many years of study, not over a dozen varieties out of more than 100 that have been introduced from the Old World are known well enough to be safe for planting on anything more than a dooryard scale. Only half a dozen are grown on an acreage basis, chiefly Deglet Noor, Halawy, Khadrawy, Zaheedy, Hayany, and Saidy. A few other varieties that enjoy a high reputation in the Old World, such as the Barhee, Khalasa, Maktoom, and Dairee, are planted on a small commercial scale. Still others, famous in the Old World,

that have made a good showing here are still so scarce that it will be many years before even small commercial plantings can be made of them. (Fig. 38.)

As a result of the cooperation of alert and intelligent American date growers, expert date packers, and scientific experts, such rapid progress has been made in the culture of the date palm and in the handling of its fruit that it can be safely asserted that more has been done to improve date culture in this country in the last 25 years than has been accomplished by the Old World date growers in the last 25 centuries.

FIGURE 38.—Young Deglet Noor date palms growing near Indio, Calif., October, 1930. The palm in the foreground carries about 15 bunches of fruit protected with burlap coverings. (Photograph by Avery Edwin Field)

A Noncompetitive Crop

The date industry in the United States is an excellent example of a new and noncompetitive crop and as such merits attention when many crops are grown in quantities so large as to be difficult to market. Every acre of irrigated land in the Southwest planted to dates is taken out of competition with the orchard and field crops of this country for a long period, probably permanently. The United States imports from 50,000,000 to 80,000,000 pounds of dates annually, and in spite of the rapid growth of date culture in the hot irrigated valleys of southeastern California and southwestern Arizona, the domestic production of dates is only between 2,000,000 and 3,000,000 pounds. Continued healthy growth of date culture is almost certain to lead to the production within the next decade of an appreciable tonnage of choice, well-cured, home-grown dates. These will be so attractive in appearance that they will readily gain a place at the banquet table and so clean and of so delicious a quality as to hold the favor of all who taste them.

WALTER T. SWINGLE, *Bureau of Plant Industry.*

DATE Ripening Controlled Beneficially by Using Special Kinds of Pollen The time of ripening of all fruits has been believed to be entirely a matter of variety as affected by environmental relations of climate, soil, and culture. It is now known that in the case of the date palm there is, within certain limits, a direct effect of pollen on the time of ripening of the fruit.

Conclusive proof of this new and unexpected influence of the pollen parent on the fruit tissues belonging to the mother plant was obtained in 1925. This effect has been called metaxenia.

The experiments have since been continued in commercial date gardens in the Coachella Valley in California and in the Salt River and Gila Valleys in Arizona, always with the same results. The effects of the pollen of more than 100 different male date palms have been studied in this way. Most of these male palms produced pollen causing the fruit to ripen in midseason. A few males caused very early ripening of the crop and a very few late ripening.

In most plants such an influence would have only scientific interest and value, but in date culture artificial pollination is commonly practiced, owing to the fact that the pollen is produced on a different plant from the one that produces the fruit. Very early in the evolution of date culture there developed the practice of maintaining only a few male palms, the pollen of which suffices for a large number of females.

Pollen from a male date palm known to cause early ripening was applied in 1930 to one group of Deglet Noor palms and that causing late ripening to another comparable group, and a record was kept of the fruit as picked from each. At the United States Experiment Date Garden at Indio, Calif., the difference in time of ripening was 15 days at the beginning of the season, increasing to 20 days when 98 per cent of the crop was ripe. At the Indian Wells district, a few miles away, where the normal ripening is somewhat later, there was a difference in time of ripening of 21 days at the beginning of the season, increasing to 37 days when 98 per cent of the crop was ripe.

Practical Value of the Discovery

As would be expected from this record, it has proved possible to utilize pollen causing early ripening to insure the ripening of late varieties in regions having too short or too cool a summer to permit the dates to mature properly. On the other hand, pollen causing late ripening is used to delay ripening of dates in regions having an excess of summer heat when the crop tends to ripen too early, as in the hotter parts of the Coachella Valley in California, now the chief date-producing region in the United States.

Date palms in the Southwestern States produce from 8 to 20 flower clusters over a period of 8 to 10 weeks in early spring, and the ripening period of the fruit bunch extends about 6 to 10 weeks, depending on the variety and on the temperature prevailing during the ripening season.

A new application of the effects of pollen in controlling the time of ripening of dates was tested in 1930. Pollen from two different male palms known to exert very diverse effects on the time of ripening of the fruit was used on a single bearing date palm. This differential pollination, as it may be called, was carried out by applying pollen known to cause late ripening to the first flower clusters to open in spring, and

pollen known to cause early ripening to the later blooms. The effect of this method of pollinating was to shorten decidedly the ripening season of the dates. When the two kinds of pollen were applied in reverse order, viz, early-ripening pollen to the first blooms and late-ripening pollen to the late blooms, the reverse effect was secured and the ripening season was decidedly lengthened.

Late Ripening Beneficial in Some Areas

The fruit of the Deglet Noor variety, the chief commercial date in this area, which matures during the extreme heat that prevails during the latter part of August and the first three weeks in September, is distinctly inferior in keeping quality and in flavor to fruit maturing in October and November, when the weather is much cooler and ripening less rapid. In most parts of the Coachella Valley a considerable proportion of the crop is harvested by the last of September, and under such conditions the exclusive use of pollen that causes late ripening is beneficial. However, in the Indian Wells district, the custom of using pollen that causes late ripening delays the beginning of the harvest until about the first of October, but the exclusive use of such pollen here throws the ripening of the latter part of the crop into December and January, and even into February. Prolongation of the ripening season into winter greatly increases danger from rain, as most of the precipitation occurs at that season; and because of the slowness with which fruit ripens in cold weather such prolongation results in a decided slowing up of the harvest with consequent greater expense in handling the fruit. The use of differential pollination to shorten the ripening period thus becomes of particular practical significance in date culture in this district, eliminating undesirable early fruit on the one hand and speeding up the ripening of the later fruit on the other hand, so as to reduce substantially the loss from late rains and a prolonged harvest.

The reverse form of differential pollination, which lengthens the ripening season by the use of pollen known to cause early ripening on the early blooms and late-ripening pollen on the late blooms, promises to prove advantageous in regions where sudden autumnal rains injure or destroy all dates in the final stages of ripening.

In marked contrast to most technical improvements in agriculture, differential pollination entails no extra cost to the grower. All that needs to be done in order to reap the advantages that have already been demonstrated is to change from one kind of pollen to another when about half of the flower clusters have opened.

Roy W. Nixon, *Bureau of Plant Industry.*

DOGS and Cats May Be Kept Off Flower Beds by Nicotine Sulphate

Dogs and cats sometimes become obnoxious about certain premises by running over flower beds, ruining shrubbery, and invading areas where they are not wanted. It is not always possible to drive away the intruders before damage has been done, and fencing is often undesirable. Many persons appeal every year to the department for some harmless means of repelling the animals without injuring either them or the shrubbery and flower beds.

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The Bureau of Animal Industry has been suggesting the use of a nicotine sulphate spray to solve this problem, and the reports received from those who have used it indicate that it is very effective. Dogs and cats find the odor of nicotine very repulsive, and since their sense of smell is very much keener than that of man it is possible to use the compound in such high dilution that it is inoffensive to any person.

Nicotine sulphate is widely used as an insecticide and when it is properly diluted and applied, it is beneficial to plants and not injurious to buildings, walls, or walks. It may be obtained at seed and fertilizer stores in packages labeled with directions for diluting and applying. If the premises are sprayed with the dilute solution, dogs and cats will avoid the neighborhood of the sprayed areas. The odor will repel them.

The spray evaporates in time and will be washed off by rain; consequently, it should be renewed about once in two weeks and after heavy or long rains. Livestock should not be permitted to graze on vegetation that has been sprayed with nicotine sulphate.

JAMES F. COUCH, *Bureau of Animal Industry.*

DROUGHT Losses of 1930 and 1931 Indicated by Crop and Income Data

Crop production in 1931 was adversely affected by drought in the spring-wheat States of North Dakota, South Dakota, and Montana and in adjacent areas in Minnesota, Nebraska, and Wyoming. In South Dakota a severe grasshopper infestation due to the unusually mild winter of 1930–31 combined with the drought to reduce crop production to the lowest level in years. Distress among the farming population of these States and among those who depend upon the farm trade for their livelihood was most severe in Montana, northern Wyoming, and western North Dakota, where drought had also occurred in 1930. The great drought area of 1930 in the Potomac, Ohio, and lower Mississippi River Basins produced larger than average crops in 1931.

Figure 39 indicates the extent of the 1930 drought. The most severely afflicted area extended from southern Pennsylvania, Maryland, and Virginia to southern Kansas on the north, Alabama on the south, and Texas on the west. In a separate area comprising a large part of Montana and portions of North Dakota and Wyoming, production in 1930 was also severely limited by drought.

The figure indicates relative conditions on about August 20, when the drought was near its peak. In some parts of the area relief came in time to improve somewhat the final outturn. In other areas the drought continued unabated until late autumn. The relative severity of the drought in 1930 is indicated by the composite yields per acre of crops expressed as a percentage of the 1919–1928 average yields. In order, these percentages are as follows: Kentucky, 60.5 per cent; Arkansas, 62.8; Missouri, 66.8; Virginia, 67.7; Oklahoma, 71.2; Montana, 70.4; Maryland, 73.4; Tennessee, 75.6; Ohio, 79.3; Illinois, 83.1; Indiana, 84.7; Texas, 86; Pennsylvania, 87.6; Mississippi, 91.5; Louisiana, 100.3; and Alabama, 111.3.

The figures quoted are averages by States and consequently do not reflect the full severity of the drought in the areas affected. Portions of such States as Ohio, Indiana, Illinois, Texas, Louisiana, and Ala-

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The figures quoted are averages by States and consequently do not reflect the full severity of the drought in the areas affected. Portions of such States as Ohio, Indiana, Illinois, Texas, Louisiana, and Ala-

bama were not in the extreme-drought area. Furthermore, the cotton crop in Louisiana and Alabama withstood the drought in a surprising manner. Consequently, in those States the composite yields for each State as a whole do not reflect the reduction in crop production in the portions adversely affected by the drought.

Damage to Various Feed Crops

The loss in crop production due to drought in 1930 was most serious for corn, sorghums, and hay and was less serious for the other feed crops—oats and barley. Winter wheat, rye, and many of the vegetable crops were largely harvested before the drought became severe. The main spring-wheat area of Minnesota and the Dakotas and the principal potato-producing sections were outside the drought area. Corn production in the United States fell to 77.1 per cent of the 1925–

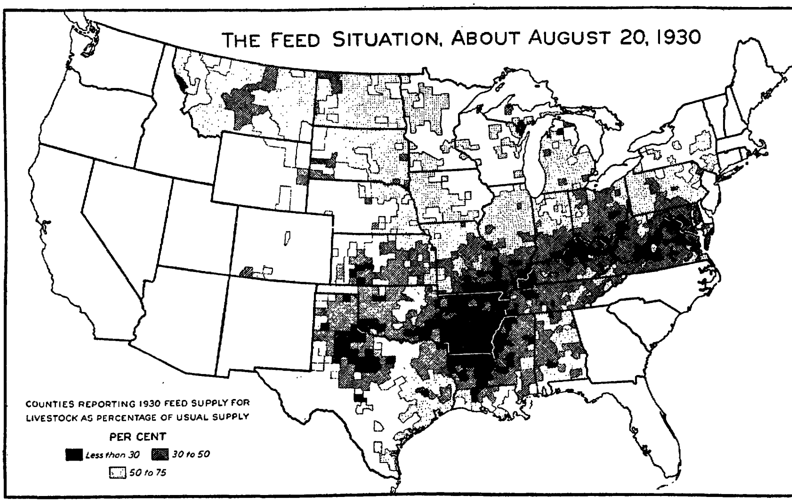

FIGURE 39.—Drought of 1930 affected crop production in many States and was particularly severe in an area from southern Pennsylvania, Maryland, and Virginia on the east to central Kansas on the north, central Texas on the west, and western Alabama on the south. An area in central Montana and western North Dakota also suffered

1929 average and hay to 88.5 per cent; oats production in the United States was 2.2 per cent above average; and barley, as a result of rapid expansion of acreage, was 35.4 per cent above. There was, however, a serious shortage of these crops in the drought area. Wheat production was 2.1 per cent above average; rye, 1.2 per cent below; cotton, 6.3 per cent below; potatoes, 8 per cent below; and tobacco, 16 per cent above.

Pastures for livestock were scant for many weeks. For the entire 1930 pasture season, pastures in the drought States were from 50 to 80 per cent of the 10-year average. Poor pastures during the summer months and short supplies of grain and hay greatly affected the production of animal products in the latter half of 1930. Thus, on August 1 milk production per cow in those States averaged 11.3 per cent below production on the same date in the previous year and egg production per hen averaged 9.5 per cent lower. In spite of somewhat curtailed production during the drought months, however, the production of

milk and eggs, both in total per cow and total per hen, for the full year 1930 was quite generally above or very close to the average of the 5-year period 1925–1929.

A mild autumn and winter greatly reduced the requirements for feed for livestock and the meat supply of 1930 appears not to have been seriously affected. Production of beef was 3 per cent above average; of calves (veal) 1 per cent below; and sheep and lambs 10 per cent above. Production of hogs was 6 per cent below the 1925–1929 production. This decrease was not entirely due to the drought but rather to declining hog numbers on hand when the drought began.

The decreased production of farm products in 1930 is reflected in the reduced farm income in the drought-stricken States. Although a considerable percentage of the reduced income in 1930 was due to the lower prices that accompanied the world-wide business depression, a

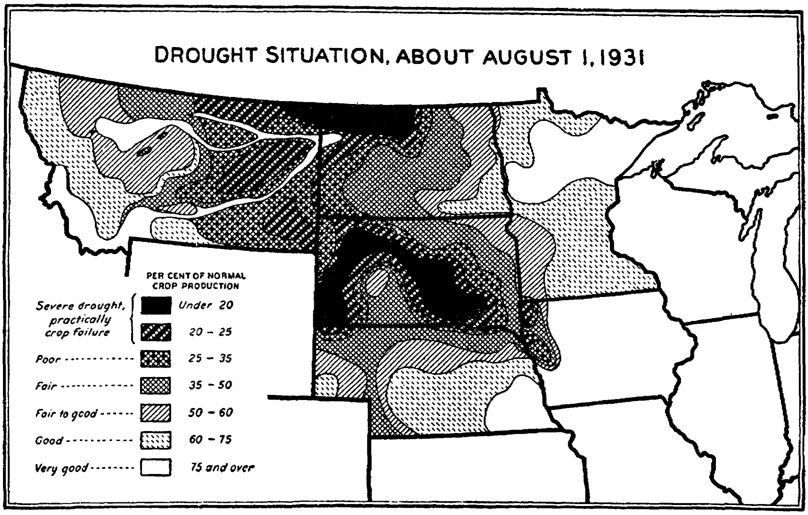

FIGURE 40.—Drought of 1931 was largely confined to the spring-wheat States of the Northwest, with contiguous areas in Idaho, Nebraska, and Wyoming. Parts of Montana, North Dakota, and Wyoming suffered in both 1930 and 1931

material part of the reduction in the drought area was brought about by decreased quantities of agricultural products available for sale or family consumption. Gross income in this group of States varied from 54 per cent of the 5-year average in Arkansas and Oklahoma to 85 per cent in Indiana, whereas gross income for the United States as a whole was 84 per cent of average.

1931 Drought Less Extensive

The drought of 1931 was more limited in area. Figure 40 shows its extent and effect upon crop conditions on August 1. Crop deterioration continued unabated until the coming of winter. The composite yields of crops in North Dakota were 55 per cent of the 10-year average yield; in South Dakota, 43 per cent; and in Montana, 54 per cent. In addition, about 18 per cent of the planted crop area was an entire failure in South Dakota, 22 per cent in North Dakota and 35 per cent in Montana. Production of practically every crop grown in those States

was less than half of average. Because of their importance in the production of spring wheat and flaxseed, the production of these crops in the United States was the lowest in many years. The spring-wheat crop was 40 per cent of the 1925–1929 average; the flaxseed crop, 54 per cent. The scarcity of both food and feed crops in those States necessitated a very considerable out-movement of livestock, particularly sheep and beef cattle, from the ravaged sections. The composite condition of pasture during the entire 1931 pasture season in South Dakota was 55.9 per cent of the 1921–1930 average; in North Dakota, 61.3 per cent; and in Montana, 53 per cent. Production of milk per cow during the pasture season was low, but for the entire year in North Dakota was 106.3 per cent of the 1925–1929 average; in South Dakota, 109.2 per cent; and in Montana, 100.8 per cent. Egg production for the year was 103.9, 107.2, and 106 per cent, respectively, of the 1925–1929 average in those States. High production in the early and late months of the year more than offset the low production of the summer months.

With greatly reduced quantities of crops available for sale and prices that were even lower than the low prices of 1930, the income of farmers in the 1931 drought area was seriously curtailed. It seemed likely that income in those States would be less than 30 per cent of the 1925–1929 average.

JOSEPH A. BECKER, *Bureau of Agricultural Economics.*

DRY Farming Calls for Native Pastures as an Important Adjunct

The history of dry-land farming is closely associated with that of the livestock industry, especially in the Great Plains area. With the introduction of dry-farming tillage methods, much of the native range was broken up, and its value as range land was destroyed. Some of the land that was broken up might better have been left in native sod and utilized as native pasture. A great deal of good native range was converted into poor dry farms.

Native pastures are an important adjunct of the dry farmer, for without them many dry farms would be of little value. The value and importance of native pastures in dry-land farming are not given due consideration in the farming scheme. The native pasture is usually the hardest-used piece of land on the farm. Within recent years native pastures are becoming better understood as an integral part of the dry-land farm.

Since 1915 the United States Department of Agriculture in cooperation with the North Dakota Agricultural Experiment Station has been investigating near Mandan, N. Dak., the problems connected with the utilization of native pastures on the dry-land farm.

The native vegetation in this area forms a comparatively dense sod and covers from 60 to 65 per cent of the ground. A large percentage of the feed for grazing animals is furnished by blue grama grass, western needle grass, and prairie June grass.

The cattle used in the grazing experiment are 2-year-old grade steers of the standard beef breeds. The period of grazing is five months, or from May 15 to October 15.

The first problem was to determine with some degree of accuracy the grazing capacity of the native range as it existed in this section. The

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next step was to work out methods of pasture management that would afford the native vegetation an opportunity to produce its maximum amount of forage.

Pastures of 100, 70, 50, and 30 acres are grazed with 10 steers each. The 100-acre and the 70-acre pastures furnish enough feed to allow the cattle to make maximum gains for the five months. The steers in these pastures gain on the average approximately 300 pounds per head. About one-third of the total gain is made in June, with decreasing amounts each month to the end of the season. The pasture that is grazed at the rate of one steer to 10 acres is larger than necessary, but that grazed at the rate of one steer to 7 acres furnishes the right amount of forage for a system of continuous grazing on the ordinary dry farm in that section of the Plains.

Five Acres to One Steer Not Enough

The 50-acre and the 30-acre pastures do not furnish enough feed to allow the cattle to put on the gains of which they are capable. The steers grazed at the rate of one steer to 5 acres gain about 240 pounds in the 145 days during which their pasture will support them. The steers grazed at the rate of one steer to 3 acres gain 170 pounds in the 114 days during which the pasture will carry them. Both pastures are overstocked, as indicated by the low gains of the steers and by an increase in undesirable plants in the pastures.

Native pastures are too often grazed like the 30-acre pasture. The remedy for such overgrazing is more native pasture, a different system of grazing, less stock, or cultivated pastures to supply early-season grazing.

A 70-acre pasture divided into three parts and grazed by a deferred and rotation system carries one steer to 5 acres through the season without injury to the native vegetation and allows an average gain of 270 pounds.

Cultivated pastures of bromegrass, crested wheatgrass, or sweetclover have a high carrying capacity in the early season and can be used to advantage to supplement the native pasture. They should be grazed early in the season and the native pasture later in the season.

The dry-land native pasture too often is not given an opportunity to produce its maximum quantity of feed because of too heavy grazing which gradually weakens the vegetation and causes a marked decrease in yield.

J. T. Sarvis, *Bureau of Plant Industry.*

DRY Farming in Extensive Operations Mainly Uses Crops of Low Acre Value

Crops may be adapted to or find their place in dry farming for different reasons—some because they are drought resistant or drought evasive, some because of comparative freedom from disease or insect pests, and others because of economies of production. Production on dry land is limited by the quantity of water that is available. Dry-land crops in general, therefore, are those of comparatively low acre values that lend themselves to efficiency and economy of production.

Wheat is perhaps the widest and most generally grown dry-land crop. It is fairly drought resistant and economic in its use of water, and its early maturity enables it to make the fullest use of water stored

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Pastures of 100, 70, 50, and 30 acres are grazed with 10 steers each. The 100-acre and the 70-acre pastures furnish enough feed to allow the cattle to make maximum gains for the five months. The steers in these pastures gain on the average approximately 300 pounds per head. About one-third of the total gain is made in June, with decreasing amounts each month to the end of the season. The pasture that is grazed at the rate of one steer to 10 acres is larger than necessary, but that grazed at the rate of one steer to 7 acres furnishes the right amount of forage for a system of continuous grazing on the ordinary dry farm in that section of the Plains.

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in the soil before it is seeded. Since wheat has both winter and spring varieties, few if any other crops are adapted to a wider range of conditions or are relatively more productive. Dry-land wheat is of the highest milling and baking quality.

Oats and barley are standard dry-land feed crops in the northern and central Plains, but south of central Kansas they are grown only when early spring rains occur and other seasonal conditions seem favorable. In some localities barley is the most productive grain that can be grown.

Rye occupies a smaller acreage but is an important crop in North Dakota, Montana, South Dakota, and Nebraska. Both winter and spring varieties are grown. Winter rye is hardier than winter wheat and finds a place where conditions are too severe for the latter crop to survive.

Except for the flaxseed grown in a few counties in southeastern Kansas, practically all that of the United States is grown in the northern Plains and adjacent prairies.

Beans are an important dry-land crop in Colorado and New Mexico, and their production is rapidly increasing in other States except where the frost-free season is very short. Cheapness of production as a result of freedom from disease is a strong factor in giving beans a place among the dry-land crops. They are also a good rotation crop with wheat.

Sorghums Are Drought Resistant

Sorghums of various kinds constitute the feed crops and some cash crops from central Kansas southward. The sorghums are drought resistant and very efficient in their use of water. They are of five general classes: (1) Milos and feteritas, dry stemmed and grown for the grain; (2) kafirs, juicy stemmed and yielding grain and forage; (3) sorgos, or sweet sorghums, with sweet, juicy, leafy stems, used for hay, forage, and silage; (4) Sudan grass, grasslike and leafy, giving hay and pasture; and (5) broomcorn, from which the brush is used for the manufacture of brooms. The stover is sometimes utilized for feed. Sorgo and Sudan grass range much farther north than the other sorghums, and they are of some importance up to the northern boundary of the United States or beyond.

Corn is a widely distributed dry-land crop, but except in a few sections is a distinctly minor one. In the primitive culture of the Indians it was and is a staple crop even under conditions of extreme aridity. As a dry-land field crop it is reasonably certain to produce a fair-to-good tonnage of feed but may fail to set ears. It is of most importance in the central and northern Plains, where it is used as a rotation crop with wheat and other small grains.

Cotton has become firmly established as a dry-land crop well adapted to the Plains region of Oklahoma, Texas, and New Mexico. Making its growth late in the season, it is able to make efficient use of the rainfall. Abundance of sunshine brings an early and uniform ripening, and in this region it is free from many of the insect and disease enemies occurring in more humid regions.

Cowpeas in southern sections and field peas in northern sections are annual legumes grown for feed. Soybeans and peanuts are less extensively grown.

Millets and prosos have a small but important place, chiefly as catch crops for hay and seed.

Cultivated perennial hay crops are of low general adaptation to dry farming, but in the Northern States with spring rainfall alfalfa, bromegrass, crested wheatgrass, and slender wheatgrass are reasonably sure and productive, but do not lend themselves to short or medium-length rotations. Biennial sweetclover is of much wider adaptation and promise as a rotation crop.

With proper care and the selection of favored sites, adapted trees, fruits, and most common garden vegetables can be raised for the protection and ornamentation of the dry-land home and for home consumption.

E. F. CHILCOTT, *Bureau of Plant Industry.*

DRY Farming in Pacific Northwest is Based on Grain and Clean Fallow

The dry-farm areas of the Pacific Northwest include most of the tillable land east of the Cascade Mountains in Oregon, Washington, and northern Idaho. The topography, elevation, soil, and climatic conditions differ widely in this area. The typical dry-farmed soils are mostly sandy or silt loams and are located in sections where the average annual precipitation ranges from 8 to 18 inches.

As in other dry-farmed sections, the annual precipitation and its distribution throughout the year are the most important limiting factors in crop production. In some areas the availability in the soil of sufficient nitrate nitrogen for the plants also is of much importance.

Unlike the dry-farmed area of the Great Plains, where most of the precipitation occurs during the spring and summer months, most of the precipitation in the Pacific Northwest occurs during the late autumn, winter, and spring months. This difference in the distribution of the precipitation not only influences the crops that can be grown profitably, but also makes changes in tillage practices necessary.

Because of lack of rainfall during the growing season, late-maturing crops such as corn are not so well suited to the Pacific Northwest as are the cereals and other crops that ripen early enough to escape the hot, dry summer weather. Winter wheat is the most widely grown and most profitable crop, spring wheat ranking second, and barley third. The most popular winter-wheat varieties are Turkey and Hybrid 128. For spring sowing Baart and Federation are the leading varieties. The most promising legumes are those that mature early. In the higher-rainfall sections field peas are commercially grown in a rotation with wheat.

Farm practice usually is the outgrowth of necessity. Successful crop production on the dry lands of the Pacific Northwest is based on alternate crops of grain and clean fallow. The experience of farmers and the results of investigations on several experiment stations in this area justify the conclusion that the alternate raising of grain and fallowing is the safest and most profitable method of crop production where the precipitation is less than 15 inches. Where the precipitation is higher, crop rotation is practicable.

The Controllable Factors

Of the controllable factors that influence yields, the preparation of the fallow has been found to be one of the most important. To maintain a good fallow the following points are essential:

Cultivated perennial hay crops are of low general adaptation to dry farming, but in the Northern States with spring rainfall alfalfa, bromegrass, crested wheatgrass, and slender wheatgrass are reasonably sure and productive, but do not lend themselves to short or medium-length rotations. Biennial sweetclover is of much wider adaptation and promise as a rotation crop.

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(1) The land should be left with stubble standing during the winter. This aids in holding the snow and in moisture absorption. Fall disking or fall plowing is not advisable. The stubble should not be burned, but should be plowed under, thus adding some organic matter to the soil and helping to prevent erosion.

(2) Land should be plowed early in the spring or when there is enough moisture to plow easily and well. If plowed late in the spring, land should be disked early enough and thoroughly enough to prevent all plant growth.

(3) After plowing, cultivation enough to keep the land free from weeds is all that is needed. The best implements for this purpose have been found to be spike-tooth harrows, spring-tooth harrows, and blade or rod weeders.

The combined harvester, a machine that has been in general use in the Pacific Northwest for more than a quarter of a century, has practically replaced all other machines for harvesting cereals. Its use in harvesting is particularly well suited to this region and is the most economical and efficient method yet devised. The use of tractors, for both tillage and harvesting operations, has greatly increased during the last 10 years, those of the caterpillar type being most popular because of being better suited for working on hilly or rolling land.

D. E. Stephens, *Bureau of Plant Industry.*

DRY-FARMING Practices Determined by Climatic and Soil Conditions The term "dry farming" was first used in the irrigated districts of the West to designate farming without irrigation in a section where irrigation was generally practiced. The term was used later in some semiarid sections to distinguish the activities of the man who cultivated the soil and sowed crops from the activities of the rancher whose livestock pastured on the native sod. The use of the term has been extended to sections that have no irrigation, and it has come to mean specifically the production of crops without irrigation in regions of deficient rainfall. But as the rational development of this activity has in many sections compelled the keeping of livestock to consume all or a portion of the crops produced, the use of the term has broadened until it has come to mean farming without irrigation under dry conditions. Aside from the exclusion of irrigation, it does not apply to a method of farming, but is descriptive of the conditions under which it is done. In the United States its use is generally limited to sections having an average annual precipitation of less than 20 inches and in the northern tier of States, where temperatures and evaporation are low and the season short, of less than about 16 inches.

Dry-farming conditions in the United States are found in the Great Plains, lying between the ninety-eighth meridian and the Rocky Mountains, and in the intermountain valleys and plateaus to the westward. The largest dry-farming areas in the intermountain region are located in the Great Basin, the Columbia River Basin, and the Snake River Basin.

The factor that distinguishes dry farming from farming in more humid regions is the limited water supply. Differences in the quantities of water available are responsible for certain fundamental differences in the practices of the two regions or types of farming.

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Effects in Humid Regions

In humid regions more water enters the soil than the vegetation that occupies it can remove. The excess water moves downward through the soil, leaching with it soluble salts and reducing fertility. As its downward passage is checked or retarded by more or less impervious soil or strata it accumulates to the point of saturation and is known as ground water, the upper surface of the ground water being known as the water table. Since there is an excess of water, there is no incentive to accumulate or conserve it. The aim is rather to have the ground occupied by a growing crop for as much of the year as possible. This affords a surface cover to prevent washing, and either furnishes economic return in the form of a harvested crop or checks the loss of fertility by taking it up in plants and returning it to the soil in green manure.

In arid and semiarid regions the amount of water that reaches and enters the soil is no more than sufficient for the current needs of the vegetation that occupies it. Seldom or never, depending upon the rainfall and soil of the area in question, does water penetrate beyond the zone occupied by plant roots. There is no downward passage of water beyond this zone, no leaching of the soil, and no accumulation of ground water or formation of a water table. The absence of a water table or the presence of a permanently dry subsoil may be properly considered as the feature that determines or distinguishes dry farming and makes its practices necessary. Water being the vital substance that is deficient or at least not present in excess quantity, its conservation and economic utilization become of primary importance in dry-farming agricultural practice.

The endeavor of the dry farmer, in contrast to that of the humid farmer, is to keep the land free of vegetation for as much of the season as is consistent with the production of crops. In its extreme form this may result in deferring cropping and maintaining a bare fallow for an entire year or longer. The object is to accumulate in the soil during this period of greater or less length a store of water to supplement as far as possible the insufficient amount that may be expected to fall while the crop is growing.

JOHN S. COLE, *Bureau of Plant Industry.*

DUTCH Elm-Disease Survey Indicates This Disease Not Widespread in This Country During the summer of 1930 the attention of the Department of Agriculture was called to wilting elm trees at Cleveland, Ohio. Careful laboratory cultures made by Curtis May at the Ohio Agricultural Experiment Station indicated the presence of the fungus *Graphium ulmi*, which in northern Europe is the cause of a serious disease of elms known as the Dutch elm disease. This determination was verified by Dr. Christine Buisman, a visiting Dutch plant pathologist, who was familiar with the diagnosis of the disease.

In cooperation with the Ohio Agricultural Experiment Station, the department instituted an immediate search for other trees affected with this disease. As a result of this search, up to October 15, 1931, seven trees affected with *Graphium ulmi* had been found in Cleveland and one in Cincinnati, Ohio. No authentic cases had been found elsewhere in the United States.

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The presence of the Dutch elm disease is indicated by the sudden wilting of the leaves of a part of the crown of the tree, of the entire tree, or of the tips of some of the side branches. Drying and discoloration of the leaves and defoliation may follow. If a clean cut is made across an affected twig, a brownish discoloration is evident in the sapwood. This discoloration, as it appears in cross and longitudinal sections of infected elm twigs, is shown in Figure 41. The smaller of the two elms shown in Figure 42 was wilting and dying in July, 1931, when the trees were discovered. The larger tree had died suddenly in the summer of 1930, but it was not found until 1931. Discoloration of the *Graphium ulmi* type was evident in the 1930 and 1931 rings of wood of the smaller tree and in the 1929 and 1930 rings of the larger tree.

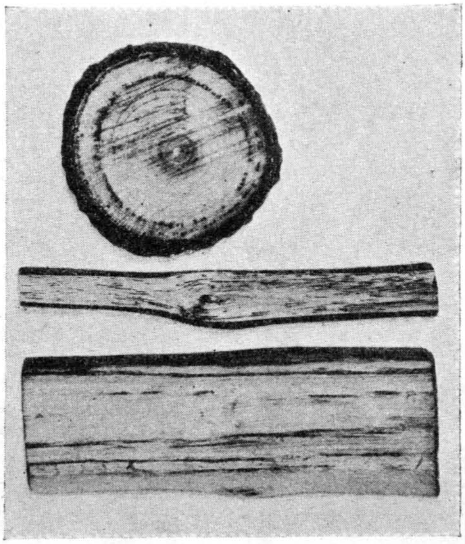

FIGURE 41.—Cross and longitudinal sections of branches of elm showing discolored woody tissue

Field Diagnosis Impossible

Unfortunately, field diagnosis of this disease is impossible. In addition to *Graphium ulmi*, at least two fungi, and probably several, and possibly some bacteria, produce the same visible external and internal symptoms. Therefore, a cooperative Dutch elm disease laboratory has been established at the Ohio Agricultural Experiment Station to select from wilting elms discovered those whose trouble is really caused by this foreign parasite. There the parasites causing disease of this type are isolated from the specimens taken by State and Federal scouts or received from interested volunteer observers and are grown in cultures until the nature of the parasite is determined. In the two summer seasons of 1930 and 1931, up to October 15, 1931, cultures had been grown from about 850 trees showing suspicious symptoms, and of this considerable number of specimens examined, *G. ulmi* was present in eight only.

Since so few trees affected by the disease have been found in this country, it was manifestly unsafe to permit these trees to remain undestroyed and to conduct here experiments to determine the mode of transmission of the disease from tree to tree. Our knowledge of the movement of the disease is, therefore, based on observations made in Europe and reports received from there. Such study of this problem as has been made there indicates that the spores of the fungus are produced in cavities made by wood borers in the killed elm wood and on the exposed surfaces of dead wood. The wood borers themselves seem to be the active carriers from tree to tree. But carriage by such insects alone can not account for movement over long distances in Europe or for movement across the Atlantic Ocean barrier from Europe to America. In Europe the area covered by the disease has gradually expanded since its first discovery in the Netherlands in 1919, till it now extends

from Norway on the north through Germany, the Netherlands, England, Belgium, and France to Italy. The movement of diseased nursery stock could effect the transfer from Europe to America, but since the establishment of Quarantine 37 on June 1, 1919, there has been almost no movement of elm nursery stock from Europe to the United States and not a single recorded case of its movement from Europe to Ohio. Under special permit for propagation, one shipment of keyaki (*Zelkowa serrata*), a related and susceptible Japanese and Chinese tree, was made to the State of Ohio from England, but this occurred before the disease had appeared in Great Britain and the stock did not go to the localities where the Dutch elm disease has been found. None of the diseased elms found in America has been traced to any nursery.

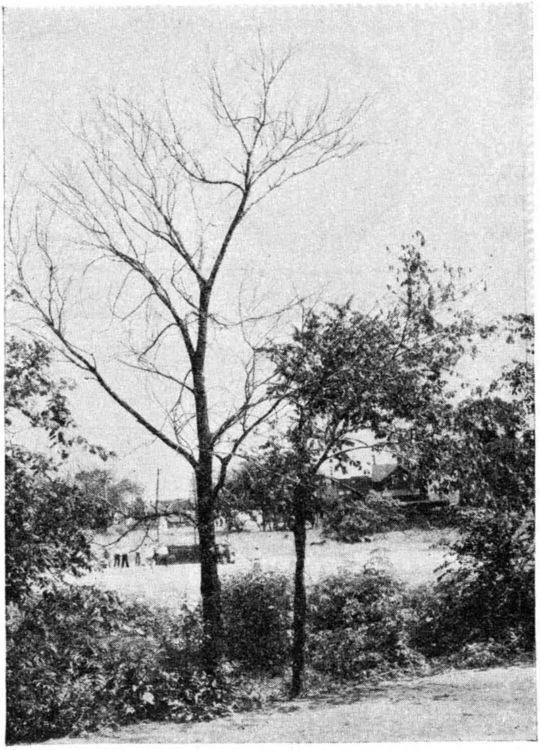

FIGURE 42.—Two elm trees discovered in Cleveland, Ohio, in 1931. The larger had died in 1930, the smaller was dying when discovered

Since the fungus withstands drying, it is possible that it was brought to America on box lumber made from affected elm trees or on infected elm leaves accidentally included in goods shipped from an affected region. But there is as yet no evidence to verify such suggestions.

Various inoculation experiments and European experience indicate that the Dutch elm disease may attack the American elm (*Ulmus americana*), the English elm (*U. campestris*), the Holland elm (*U. hollandica*), the Scotch elm (*U. glabra*), and the nearly related keyaki (*Zelkowa serrata*). Thus far inoculations made on the Chinese elm (*U. pumila*) have not produced the disease. In America there are several other species of elms whose susceptibility to this disease is being investigated.

Greater Part of Ohio Surveyed

During the growing seasons of 1930 and 1931 the greater part of Ohio was surveyed for this disease, especial attention being given to the immediate vicinities of the discovered infected trees at Cleveland and Cincinnati. Scouts were sent into the field by both the Federal Government and the Ohio State Department of Agriculture. Scouting trips were also made into Indiana, Illinois, Missouri, Kentucky, and West Virginia. Scouts and forest pathologists engaged in other parts of the country also searched for the disease. Descriptions of the trouble

were sent to interested persons in all parts of the country, and a gratifying response came from plant pathologists, foresters, tree surgeons, park commissioners, and lovers of trees in general.

While the outlook is bright and we may even hope that this disease, so serious in Europe, is in the United States purely local and confined to two points, yet it is not time to relax our vigilance. Elms are almost everywhere in the United States. Cooperative search for the disease alone can cover them. During the next growing season those interested in elms either as shade and ornamental or as forest trees are urged to watch them carefully for wilting accompanied by browning of the recent wood rings. Whenever such a case is discovered, the infected twigs should be cut, well wrapped, and mailed for diagnosis to the Dutch elm disease laboratory, Ohio Agricultural Experiment Station, Wooster, Ohio.

R. KENT BEATTIE, *Bureau of Plant Industry.*

EGG Hatching Prevented by Certain Bone Defects of the Developing Embryo One of the greatest sources of loss to the poultry industry is the failure of fully one-third of all the eggs incubated in the United States annually to hatch. Among the causes for this high proportion is the development in the growing embryo of certain bone defects which make hatching impossible. These defects may arise from faulty conditions of storage or incubation of the egg, from faulty nutrition of the hen that laid the egg, or from inheritance.

Defects Caused by Faulty Storage or Incubation

The two sides of the upper beaks of some embryos grow unequally because of the absence or lack of development of one of the eyes. The beaks of such embryos become crossed so that they are unable to pip. The upper beaks of other embryos are entirely lacking or are very small because of rupture of the brain during the first days of incubation. Defects such as these are sometimes caused by too high temperature—over 70° F.—of the room in which the eggs were stored before incubation. Other possible causes are an unduly low temperature immediately after laying, or too high or too low incubation temperatures.

Bone Defects of Nutritional Origin

Lack of sufficient vitamin D in the diet or lack of direct sunlight for breeding hens causes the bones of embryos developing in eggs produced under such conditions to be so soft as to prevent hatching.

Lack of sufficient, good-quality protein in the diet of breeding hens probably causes the condition called chondrodystrophy in the embryos developing in the eggs of some hens under such conditions. Embryos so affected have hard bones but the leg bones are bent sharply and the beaks are parrotlike. Such embryos do not hatch. A mixed animal-protein supplement, such as a combination of meat meal, fish meal, and dried milk, in the diet of the breeding hens, will prevent the condition.

Bone Defects of Hereditary Origin

Fowls of the "creeper" type, so called because of short or defective legs, carry an hereditary character that prevents the hatching of one-

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Bone Defects of Hereditary Origin

Fowls of the "creeper" type, so called because of short or defective legs, carry an hereditary character that prevents the hatching of one-

fourth of the fertile eggs from matings among creepers. Adult creepers have very short legs but the embryos that are unable to hatch because of the inherited trait have almost no legs and die early in the incubation period. As far as is known, all creepers have this hereditary defect.

Another condition, called "stickiness" (fig. 43), prevents the hatching of about one-fourth the embryos in eggs from breeding stock in which this hereditary characteristic occurs. Fowls which transmit stickiness are perfectly normal in appearance. Sticky embryos fail to absorb the liquid in which every embryo is immersed until the eighteenth day of incubation, and consequently are sticky at hatching time. These embryos have very soft bones. Embryos not affected by hereditary stickiness sometimes fail to absorb this liquid, but such embryos have bones of normal hardness. An abundance of vitamin D added to the diet of the breeding stock does not prevent hereditary stickiness. This objectionable quality, however, may be eliminated from flocks in which it is present by selecting for breeding only the offspring of fowls which produce no such embryos.

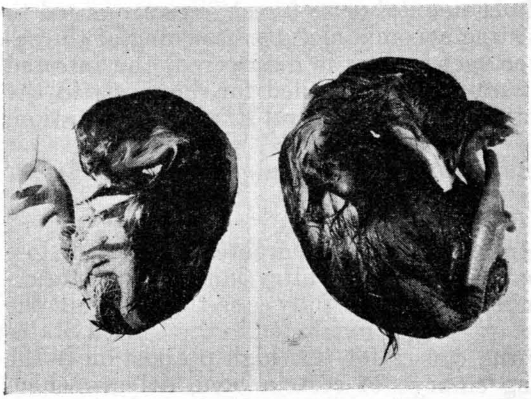

FIGURE 43.—Left, a full-term "sticky" embryo; right, a normal embryo of the same age and ancestry

THEODORE C. BYERLY, *Bureau of Animal Industry.*

EGG Size and Numbers Can Be Increased by Methodical Breeding The need for a high average production of eggs to insure profitable returns from poultry flocks is generally recognized. Information from the Massachusetts, Ohio, California, and New York experiment stations, as well as from the United States Animal Husbandry Experiment Farm, Beltsville, Md., shows that income over feed costs rises as production increases. This information shows, likewise, that profits in poultry keeping are directly related to average egg production per bird. Since increased egg production for the flock is the most practical way of insuring profit, the fundamental importance of improving egg-laying ability can readily be seen. The poultry industry sustains a serious annual economic loss because large numbers of pullets fail to reach a profitable level of production and must be culled. On commercial poultry farms only about 50 per cent of the pullets are considered to be valuable enough to be retained for a second year.

The use of high-producing hens in flock matings tends to result in offspring of satisfactory laying ability, but consistent advancement seldom occurs unless a system of progeny testing is used which enables the poultry breeder to recognize breeding worth in individuals and

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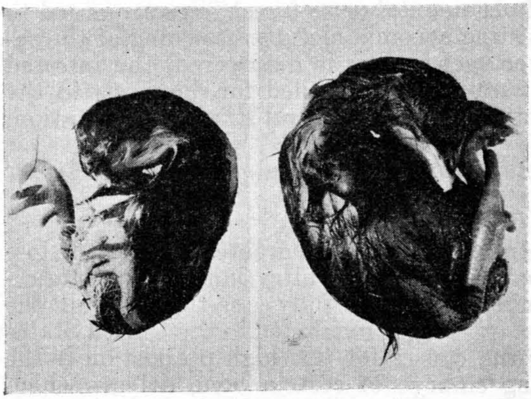

FIGURE 43.—Left, a full-term "sticky" embryo; right, a normal embryo of the same age and ancestry

THEODORE C. BYERLY, *Bureau of Animal Industry.*

EGG Size and Numbers Can Be Increased by Methodical Breeding The need for a high average production of eggs to insure profitable returns from poultry flocks is generally recognized. Information from the Massachusetts, Ohio, California, and New York experiment stations, as well as from the United States Animal Husbandry Experiment Farm, Beltsville, Md., shows that income over feed costs rises as production increases. This information shows, likewise, that profits in poultry keeping are directly related to average egg production per bird. Since increased egg production for the flock is the most practical way of insuring profit, the fundamental importance of improving egg-laying ability can readily be seen. The poultry industry sustains a serious annual economic loss because large numbers of pullets fail to reach a profitable level of production and must be culled. On commercial poultry farms only about 50 per cent of the pullets are considered to be valuable enough to be retained for a second year.

The use of high-producing hens in flock matings tends to result in offspring of satisfactory laying ability, but consistent advancement seldom occurs unless a system of progeny testing is used which enables the poultry breeder to recognize breeding worth in individuals and

families. By persistence in testing the offspring of individual matings, he can develop a group of proved sires and dams to serve as a source of cockerels for improving future production. The trap nesting and pedigreeing entailed in methodical work of this kind help to disclose ability to transmit not only egg production but also egg size and hatchability and the constitutional vigor of individuals and families. Since these characteristics are hereditary, the selection of the more desirable birds can be carried on with increased efficiency. Good results will almost invariably be attained if careful records are kept and applied. Figure 44 shows a high-producing Rhode Island Red family developed at the United States Animal Husbandry Experiment Farm through progeny testing.

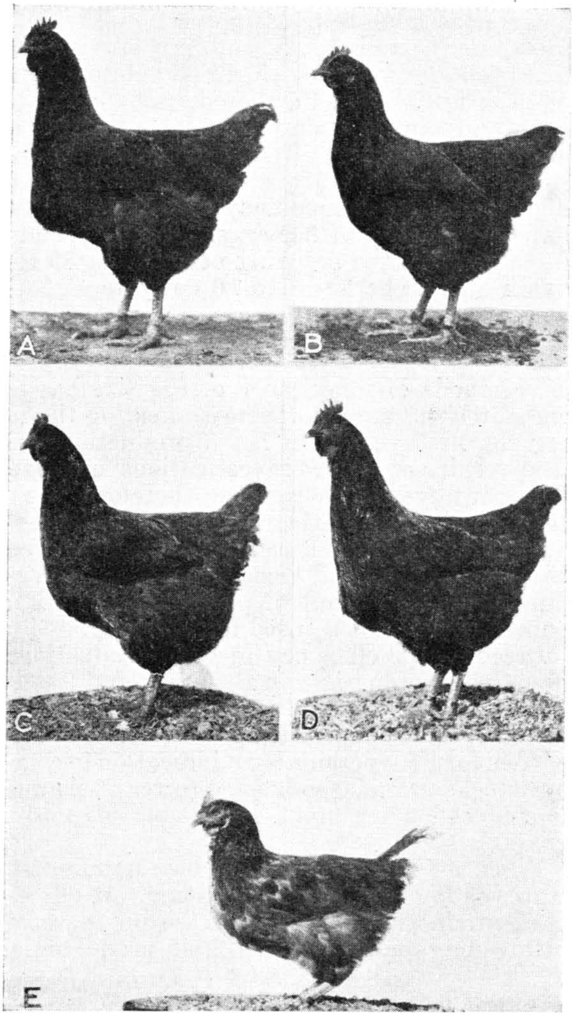

FIGURE 44.—High-producing Rhode Island Red family developed at the United States Animal Husbandry Experiment Farm, Beltsville, Md., through progeny testing: A, Foundation hen, No. 10011, produced 187 eggs in one year; B, hen No. 1795, daughter of hen No. 10011, produced 236 eggs; C, hen No. 5846, daughter of hen No. 1795 and granddaughter of foundation hen No. 10011, produced 232 eggs; D, hen No. 6268, granddaughter of hen No. 1795, produced 274 eggs; E, hen No. 2553, great-granddaughter of hen No. 1795, produced 310 eggs. Photograph of hen No. 2553 was taken October 20, 1931, when she was in heavy molt after 13 months' steady laying

Body Conformation Not a Reliable Guide

The progeny test would be unnecessary and progress in breeding would be less difficult, if it were possible to select vigorous, high-producing stock by such external characters as body shape or head points. Several investigations have shown that live-bird measurements are of relatively little value in classifying birds on the basis of egg-producing ability. Recent studies at the animal husbandry experiment farm furnished additional confirmation of this point, indicating that there is no significant correlation between head and body measurements of live birds and egg production in White Leghorns or Rhode Island Reds. Skeletal measurements of a small group of White Leg-

horns likewise failed to show any close correlation with egg production. Consequently, there seems to be little basis for the belief that, in the domestic fowl, body conformation is a reliable indication of egg-laying ability.

It is well known, however, that the ability of a bird to lay consistently at a high rate is unquestionably inherited, and, as already mentioned, hatchability and egg size are likewise inherited traits. The economic importance of hatchability is evident from the fact that one-third of all eggs incubated annually fail to hatch. From a breeding standpoint, a male with a large number of high-producing sisters and half sisters may often be disappointing in the number of progeny sired, because he carries factors for low hatchability. Likewise, a high-producing female may be unsatisfactory because of the poor hatching quality of her eggs. A high-producing hen is desirable for further use in the breeding pen if from 85 to 90 per cent of her eggs hatch and if she has 8 to 10 daughters of high uniform production.

Large Production for Long Periods Is Sign of Vigor

The mode of inheritance of egg size has not yet been determined accurately because the factors affecting the mean weight of eggs during the first year of a hen's production are apparently numerous. The results of a few investigations indicate that small egg size is dominant over large egg size; therefore, the use of hens laying small eggs, or the use of their sons as breeders, should be avoided. Size of eggs is important because it is closely correlated with size of chicks hatched. Individual variations in size of egg may account for wide differences in amount of profit per hen. Eggs weighing less than 2 ounces should not be used for hatching.

Breeding for efficiency in both production and reproduction must be based also on vigor in the stock and freedom from disease. Sedulous care in feeding and management of the chicks will not be effective in overcoming the handicaps of inherited defects. A large production of eggs for long periods is an indication of vigor and chicks from vigorous stocks are relatively easy to rear. Annual replacement costs can be reduced when stock is capable of producing profitably for two years.

When a farm flock owner does not find it practicable to conduct trap nesting and progeny testing, an effective means of increasing flock-production efficiency is the purchase of pedigreed baby chicks or breeding males of known high-producing ancestry.

J. P. Quinn, *Bureau of Animal Industry.*

EGGS Oiled by Vacuum Carbon Dioxide Method Keep Better in Storage

Shell eggs are one of the most perishable of food products that are stored for long periods of time. The eggs removed in November, December, and January, after several months of storage, generally have distinct "storage flavors," or weaknesses not present in fresh eggs. Many attempts to prevent this deterioration have been made.

Various preservative treatments have been suggested, some for eggs stored under refrigeration and some for those held at ordinary temperatures. In recent years, the use of colorless and tasteless mineral

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Various preservative treatments have been suggested, some for eggs stored under refrigeration and some for those held at ordinary temperatures. In recent years, the use of colorless and tasteless mineral

oils to seal the shell pores and to prevent evaporation and other changes in eggs during storage has gradually increased.

In studying this method of preserving eggs it was found that the eggs could be better sealed and preserved if the oil was forced through the shell pores. Consequently the Bureau of Chemistry and Soils developed a new method of treating eggs which consists essentially in drawing out by means of a vacuum, a portion of the air normally present in the egg, coating the shell thinly with oil, and releasing the vacuum with carbon dioxide gas. The return to normal air pressure carries the oil into the shell pores and effectively seals them. Studies have shown that the oil does not penetrate to the inside of the egg, but remains between the shell and the membranes. As a large portion of the oil is drawn to the inner surface of the shell the eggs dry quickly and have a less oily appearance than eggs oiled by the ordinary methods. This is an advantage in handling and retailing.

Acidity Important in Egg Quality

Acidity is important in maintaining egg quality. One factor which influences the amount of acid in shell eggs is the gas, carbon dioxide. This gas is lost through the pores of the normal egg; its loss causing a marked decline in acidity. In oiling shell eggs, the Bureau of Chemistry and Soils has found that releasing the vacuum with carbon dioxide gas rather than with air aids markedly in maintaining the acidity or hydrogen-ion content of the egg white. Eggs treated in this way stand up better in storage than do the open-dipped eggs.

That the vacuum carbon dioxide method has merit is shown by comparisons under well-controlled conditions with unoiled eggs, and with eggs oiled by other methods. Experiments in which the eggs were treated and graded in the laboratory and stored in a commercial egg-storage room showed that during 11 months' storage the unoiled eggs lost 7.71 per cent of their weight, and the open-dipped eggs lost 1.6 per cent, whereas the vacuum carbon dioxide-dipped eggs lost only 0.1 per cent of their total weight. The fall in grade was equally striking. After 11 months' storage none of the unoiled eggs were in the two top grades (Specials and Extras), whereas 30.14 per cent of the open-dipped eggs and 46.7 per cent of the vacuum carbon dioxide-dipped eggs were classed in these grades.

The unoiled eggs showed an average pH of 8.99, the open-dipped eggs an average pH of 8.63, and the vacuum carbon dioxide-treated eggs an average pH of 8.2. The additional acidity in the carbon dioxide-treated eggs aids materially in maintaining egg quality.

Several hundred cases of high-grade eggs have been oiled by the vacuum carbon dioxide method and are being stored under commercial conditions. These studies should indicate whether the application of the new method to commercial practice is feasible.

LAWRENCE H. JAMES, *and* T. L. SWENSON,
Bureau of Chemistry and Soils.

ERGOT Importations Are Tested for Quality and Purity by U. S. Officials Rye is subject to a disease, caused by a parasitic fungus, ergot, which is disastrous to the rye itself, but which results in the production of a useful drug. Farmers in this country make every effort to keep this disease out of their fields. Nevertheless, even in the United States, some ergotized

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rye is found. The millers adopt means of sifting it out of the rye because the fungus is poisonous. These siftings might, perhaps, be utilized to furnish a supply of the drug, but apparently this has not been regarded as profitable here. In Europe, however, where ergot in rye is much more common than in this country, the drug is gathered in ton quantities. Farmers in Europe collect this material and sell it to drug dealers who dry it carefully to prevent its becoming moldy, then preserve it in warehouses where it can be kept dry and free from worm or insect infestation. These dealers, located principally in Spain, Portugal, Germany, Russia, and Poland, ship the drug all over the world.

If not properly kept, ergot readily deteriorates, becoming moldy and worm-infested. The Federal food and drugs act prohibits the importation into this country of the deteriorated drug. It is the duty of the Federal Food and Drug Administration to see that only the pure drug gains entrance at our ports. To accomplish this, all importations, before they are delivered to the American purchaser, are subjected to Federal examination. Not only is the drug required to be free from deterioration, as judged by its general appearance, but it is tested to determine whether it possesses the medicinal quality for which it will be used.

Uses of Ergot

Ergot has been used in this country for more than 100 years to prevent hemorrhage after childbirth. At the present time, other drugs, more quickly acting, are replacing ergot to a considerable extent. Even so, a considerable amount of the drug is still used and under some circumstances, there is no better medicinal agent. For a long time it was not known what particular constituent was responsible for the drug's effects. This lack of information sometimes led to the preparation of the drug in a way which we now know resulted in discarding the really important principle and retaining worthless constituents. Increased knowledge of the drug's character has enabled manufacturers to prepare for physicians a potent, uniform, and reliable preparation. The Food and Drug Administration continuously surveys crude ergot on the American market, as well as preparations made from it, upon which the physician depends in his practice.

Efforts have been made to determine the potency of the drug by chemical means. While some encouraging results have been obtained, the only methods generally accepted as giving certain and accurate estimates are what are known as biological-assay tests. The law requires these processes to involve actual experiments upon animals. Loss of human life might result if the drug were not up to legal standard. The only test which is legal under the Federal food and drugs act requires the use of roosters. Briefly described, this test consists in observing the effect on the rooster's comb when the liquid ergot preparation is injected by means of a hypodermic syringe. If the drug is potent, as it ought to be, it will constrict the blood vessels in the comb, preventing the free circulation of blood, thereby changing the normal, healthy, red color of the comb to a dull purplish tint. If the drug fails to produce this effect, it is not potent and, if administered to a patient, would not be as effective as the doctor has a right to expect.

If the drug does not meet legal standards, the Department of Agriculture refuses to permit its entry into this country. If the article

tested is an ergot preparation being distributed in interstate commerce in the United States, and if it falls below the required standard, the consignment is seized and destroyed or otherwise disposed of in such a way that it will not be used for medicine.

W. T. McClosky, *Food and Drug Administration.*

EROSION Control Proves Successful on Ranges in Southeast Oregon Forest officers and stockmen on the Fremont National Forest in southeastern Oregon are making notable progress in the control of erosion. They are also carrying on practical everyday research in determining the types of dams best suited to the different soil, slopes, and weather conditions of the region.

The Fremont Forest is a high plateau containing almost a million acres. Throughout this area are many mountain meadows and upland grass and sage prairies which furnish much forage for sheep and cattle. On these areas gully erosion threatens to become a menace, and the control work is being done here.

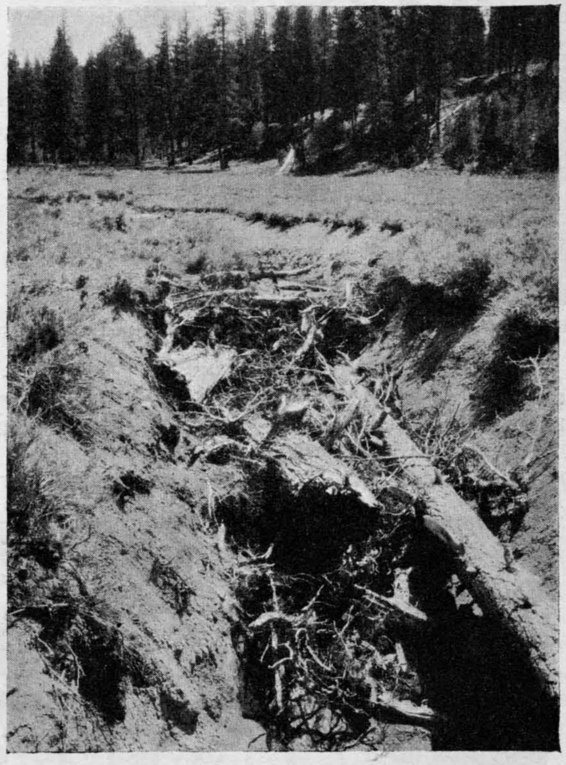

FIGURE 45.—A simple dam of brush is very effective in removing much of the soil from the water as it filters through the dam

Erosion found on the Fremont Forest is caused by a combination of factors but is principally due to three causes:

(1) Disappearance of beaver and beaver dams which at one time assisted greatly in storing water and preventing gully washing during flood periods.

(2) An extended period of drought which greatly reduced the growth of soil-binding vegetation.

(3) Rodent infestation, honeycombing and aerating the soil.

Keeping the soil continuously covered with a complete stand of vegetation is the only certain method of preventing erosion, and this is the objective toward which local forest officers are working.

Legislative action for the protection of beaver has been obtained, and the Bureau of Biological Survey, the Forest Service, and stockmen are cooperating to exterminate ground squirrels. Simple, practical, range-management plans, providing for deferred and rotation

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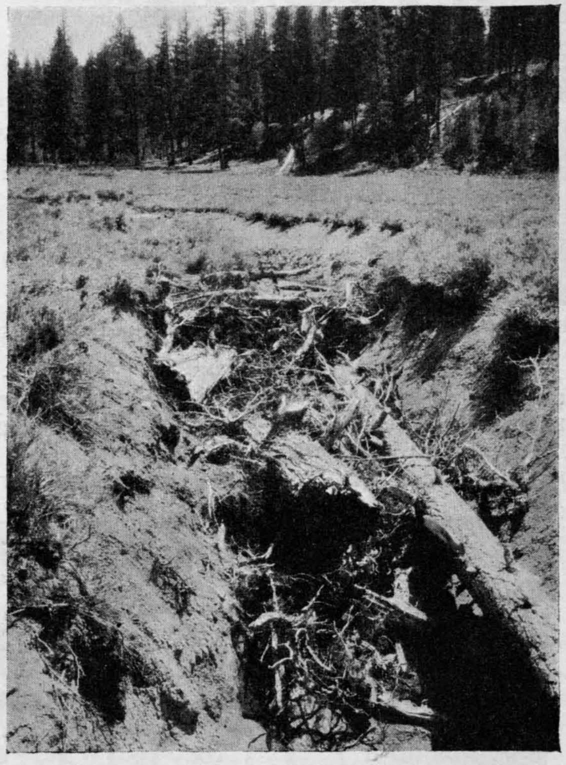

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FIGURE 46.—Where they are available, rocks make very suitable material for dams

grazing, have been developed for improving both the quality and the quantity of vegetation.

Erosion damage is being repaired and further erosion prevented by dams designed (1) to check the force of flow and cutting power of the water and (2) to fill up the gullies. (Fig. 45.) Dams of rock, brush, and combinations of these materials have been employed and have been made to serve the double purpose of preventing the undermining and cutting action of the water and at the same time of building up a dirt fill. (Fig. 46.)

Already the work is bearing fruit. In the larger gullies—10 to 15 feet wide and 10 feet deep—where several dams have been built in series, each succeeding run-off brings down its load of silt and drift débris and deposits it behind the structures to build up fills so that in many cases the original level of the land is being

FIGURE 47.—Woven wire placed across gullies collects drift and soil and reduces the force of flow

rapidly restored. Smaller structures placed near the heads of channels are very effectively checking further erosion.

To be successful (fig. 47), erosion control must stop gullying while the gullies are small, and it is by doing this that the work on the Fremont Forest has been so effective. Moreover, the work has been done without appropriation and expenditure of large sums of money, much of it being incidental to the regular duties of local rangers.

W. L. DUTTON, *Forest Service.*

EXTENSION Records Show That Improved Practices Pay in Poultry Profits The poultry industry has always been beset with schemes that look well on paper but fail when put into practical operation. The extension poultry specialists and county agents, who come in daily contact with the farmers and commercial poultrymen, do not take up with alluring get-rich-quick ventures. They have found it more practical to recommend and advocate improved practices that are backed up by scientific information and that have a demonstrated value. In many instances such practices have proved successful, not only with individual cases but with large numbers of cooperators. An excellent illustration is the "Grow Healthy Chicks" program now being carried out in more than 40 States. This plan emphasizes fundamental flock-management points in raising the pullets. These practices include the use of vigorous, disease-free breeding stock; clean, sanitary ranges; and clean and efficient feeding. In Missouri the yearly records of over 100 farms were collected and analyzed to check up the results of this "Grow Healthy Chicks" campaign. It was found that the farmers following the Missouri plan obtained 166 eggs per bird, while those following ordinary methods were able to gather only 139 eggs per bird—a difference of 27 eggs. This increased production was highly profitable, for it was found that where the improved practice was followed, the return from the average hen in the flock, above the cost of feeding, was 74 cents more than the return from the average hen in flocks in which ordinary raising methods were followed.

Control of Disease of Turkeys

In recent years science has contributed much toward the control of that dreaded disease in turkeys known as blackhead. New methods of combating this disease have been evolved, and a turkey-management system has been perfected, so that blackhead is not the menace it once was in the turkey industry. The blackhead disease drove Turkey production from the New England States to the Middle West, and from there to the great open spaces of the West and Southwest. The Oregon Extension Service has been active in promoting better methods of turkey management in rearing, feeding, and dressing. An excellent illustration of the results of improved practices which brought increased profits was furnished by a flock which matured 408 turkeys from 29 breeding hens. These birds, when dressed for market, graded 99.7 per cent prime and choice, while the average producer in the Oregon turkey pool had only 87.6 per cent prime and choice birds. Twelve per cent more top-grade turkeys, with a higher price of 5 or 6 cents per pound, amounts to a very material increase in returns.

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An excellent example of the practicability of a disease-prevention program comes from Connecticut. Here many flocks were visited each fall by an outbreak of fowl pox, more commonly called chickenpox. Though this disease is seldom fatal, yet the decrease in production and the loss in efficiency of the hen are factors in the annual income.

A quick and inexpensive method of immunizing the pullets was developed, and arrangements were made for a laboratory to prepare and distribute a vaccine. The method perfected consisted in taking growing pullets about 10 weeks old, plucking four or five feathers from the leg of each, and painting the spot with the liquid vaccine. In one year over 80,000 birds were vaccinated, and records of the egg production from these flocks were compared with those from flocks composed of 30,000 birds which were not vaccinated. This comparison showed an average difference of 5½ eggs per bird, in favor of the vaccinated birds.

Results of Flock Management Program

Whenever a recommendation covers a variety of points it is always more difficult to show definite results than from a single practice. In Illinois a complete sanitary flock-management program for the laying flock has been developed. This includes: (1) Confining the birds to a double-yarding system, allowing them outside runs on sunny winter days; (2) applying certain biological tests to mature birds; (3) equipping poultry houses with proper ventilation and sanitation devices and thoroughly cleaning and disinfecting them regularly; (4) raising all young chicks on clean range away from the old stock. This long list of improved practices limits the number of persons who can qualify, yet 50 owners who carried out all the points, were found. The records of their flocks, when compared with the records of flocks on 196 farms on which the specifications could not be complied with, showed a marked improvement. Flocks on the farms on which the sanitation program was carried out produced 27 more eggs per bird, and a labor income of 61 cents more per bird, than did the flocks on the farms where the measures were not carried out.

One interesting point in these records is that the total investment per hen in the sanitation flocks was only $4.14, whereas in the nonsanitation flocks the investment was $4.69. In other words, these flocks were practical farm flocks, not millionaires' playthings. The selling price per dozen eggs was 1 cent more on the sanitation farms, and the feed cost per dozen eggs was 3 cents less. This low investment, coupled with a better average selling price and low feed cost, explains the difference of 61 cents labor income per bird.

It is by such records that the poultry extension specialists and county agents show the flockowner that the practices advocated are practical and bring about increased profits.

H. L. Shrader, *Extension Service.*

EXTENSION Services Emphasize Milk Quality in Cooperative Program

Milk, pleasing to the taste, clean, safe, and with good keeping qualities, produced under sanitary conditions, is what the consuming public desires. Such milk stimulates consumption and, therefore, benefits the dairyman producing it. The same principles hold true for the products made from milk, such as butter, cheese, and ice cream.

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H. L. Shrader, *Extension Service.*

EXTENSION Services Emphasize Milk Quality in Cooperative Program

Milk, pleasing to the taste, clean, safe, and with good keeping qualities, produced under sanitary conditions, is what the consuming public desires. Such milk stimulates consumption and, therefore, benefits the dairyman producing it. The same principles hold true for the products made from milk, such as butter, cheese, and ice cream.

A number of State dairy specialists have incorporated in their programs methods for instructing dairymen in the few simple and easily applied steps in producing a high-quality product. Every year the dairymen of this country are handicapped by having to take a preventable loss running into millions of dollars, because of off-flavor sour milk, or milk of high bacterial count. The reduction of this loss to the dairymen and the creation of a greater satisfaction on the part of the consuming public, with the resulting increase in consumption of milk, is the goal of extension effort.

The methods of attack on the problem of low-quality milk are varied. They can be grouped, however, into three general divisions: (1) Educational work with adults, (2) 4-H milk-quality-improvement clubs, and (3) area-improvement plans.

The educational work with adults is now being carried on in a number of States. A plan for a project, describing the manner in which such work can be conducted, is available in mimeographed form. The plans contemplate the use of a wide variety of extension methods and includes surveys, publicity, meetings, circular letters, exhibits, and motion pictures. The Federal extension forces cooperate with the State departments of agriculture and public health, and with local health authorities, milk producers' associations, milk dealers, and the leading dairymen.

4-H Clubs Cooperate

The 4-H milk-quality-improvement clubs are organized for the purpose of training boys and girls in methods of producing a high grade of milk. These boys and girls will be the leading dairymen, dairywomen, and dairy leaders of their generation. Upon the foundation laid now will largely depend a continuance of progress in improving the quality of milk. The suggested project work for such clubs has been prepared as a series of tests and comparisons on milk samples which are to be studied by the members and handled in certain ways in order to bring out the benefits of certain production methods.

The area plan closely links up educational work with adults and regulatory work in a given area, and offers to smaller towns and communities the same satisfactory supervison of milk supplies that is enjoyed by large cities. The educational work on production of high-quality milk is conducted with the dairymen in the same manner as in the adult work above outlined. The field of operations, however, is a definite area, such as a county or a number of towns and communities within a limited radius. In addition to the educational program with the producers, sentiment is developed with consumers; dealers, and town and county officials, in cooperation with the representatives of the State departments of agriculture and public health for a safe supervision of milk supplies. The establishment of a well-equipped laboratory with a trained worker and a field inspector in each area is made possible by the cooperation of the various towns and communities within the area, these units financing the laboratory with contributions in proportion to their populations.

The three phases of this work have been developed for one purpose—improving the quality of milk. Improvement of milk quality is essentially an agricultural problem and responsibility. Extension agencies should supply the leadership. In no way need this program interfere with the regulatory work of the constituted authorities; rather it supplements that work. Such a program lays the groundwork for

better-quality milk, creates sentiment on the part of the producer, consumer, and dealer for better-quality milk and forms an important part of the plan of dairy extension work in every State.

JOSEPH B. PARKER, *Extension Service.*

EXTENSION Work in Hawaii Has Many Problems Not Found on the Mainland Cooperative extension work was established in the Territory of Hawaii November 1, 1928. The Smith-Lever Act, May 8, 1914, establishing cooperative extension work between the United States Department of Agriculture and the land-grant colleges in the several States, had not included the Territories in its provisions. Boys' and girls' clubs, somewhat similar to those of the mainland, also were established by the Federal experiment station. The University of Hawaii for many years previous to 1928 had been receiving small appropriations from the Territorial Legislature for extension work.

The Territory of Hawaii is made up of an archipelago in mid-Pacific and lies wholly within the Tropics. Climatically it is subtropical rather than tropical. Rainfall in different localities is exceedingly variable, depending upon the altitude and on whether the land exposure is to windward or leeward. The annual rainfall varies from 0 to over 400 inches. The soil is of volcanic origin and is fairly fertile. Large quantities of chemical fertilizer are used in crop production. There are five major islands extending 400 miles from northwest to southeast; Kauai, Oahu, Molokai, Maui, and Hawaii. Other smaller islands of some importance are Niihau, Kahoolawe, and Lanai. The total land area is 6,407 square miles, or about that of Connecticut and Rhode Island combined. There are 310,000 acres in cultivation. While Hawaii is primarily agricultural, there are few farmers in the mainland sense. Hawaii's agriculture is under the control of a few large corporations and a number of somewhat smaller companies. The 1930 Federal census shows 4,794 farmers. Sixty-two per cent of the value of the agricultural output of the islands is in sugarcane and 30 per cent in pineapple products. These are produced on great plantations operated by corporations with indentured labor, at present mostly Filipinos and Japanese. The beef-cattle industry, which ranks third, amounts to only 2 per cent, coffee to 1.31 per cent, dairying to 1.12 per cent, poultry to 1 per cent, and rice to 0.534 per cent.

Population is of Many Races

The island population (568,336) is quite cosmopolitan, orientals predominating. The most important elements other than the native Hawaiian are Chinese, Japanese, Koreans, Filipinos, Portuguese, and Scotch, and a few other Europeans, and Americans from the States. The schools are excellent. English is spoken by all of the younger generation and is the language of business and society. The title to the land is held mostly by a few large estates, and most of the large plantations as well as the small farmers operate under leasehold. Camps for the families of plantation laborers consist of small frame cottages, each usually equipped with running water, electric lights, a sewage disposal system, a bath, and laundry facilities. The agricultural products other than sugar and pineapples consist of rice, coffee,

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poultry, dairy and livestock products, bananas, papayas, avocados, citrus fruits, and vegetables. This small production is carried on by Chinese, Japanese, Portuguese, and a few Hawaiian farmers. The agricultural extension service is organized as one of the units of the University of Hawaii. There are two assistant directors, one for agriculture and one for home economics, each being in charge of all extension work in his respective field. There are 10 county extension agents, 5 each in agriculture and home economics. There are territorial agents in animal husbandry, forestry, marketing, and sugar technology. The extension staff is well trained, its members being graduates of the University of Hawaii or of mainland colleges. Four employees have had extension experience in the States. Entire salaries and all expenses of the staff, including the county extension agents, are paid by the University of Hawaii and the United States Department of Agriculture. The home-economics extension work is done through home-demonstration clubs, and the agricultural work through individuals or community and commodity groups. The boys and girls' 4-H extension clubs are identical with the organizations on the mainland.

Character of the Extension Work

Extension work in the Territory is quite different from the work in the States. The two leading crops, sugar and pineapples, each support great research organizations of their own. The sugar-planters' experiment station has an annual budget of $525,000, and the experiment station supported by the Hawaiian pineapple canners has an annual budget of $350,000. Under the system of corporation farming with indentured labor, it is possible for the corporations to put into immediate practice the results of research. The effectiveness of this system is manifest by the enormous yields and the high-quality product. As much as 18 tons of raw sugar and 20 to 30 tons of high-class pineapples are produced per acre. The fringe of farming outside of pineapples and sugarcane is carried on for the most part on land operated under leasehold. The principal agricultural enterprises open for extension work are coffee, bananas, rice, fruit, swine production, home gardening, poultry, and dairying. There are a few range-livestock outfits operated on a very extensive scale, such as the Parker ranch which has 30,000 purebred and high-grade Herefords. This ranch probably has the largest purebred herd of Herefords in the world.

The opportunities for community groups in cooperative organizations are handicapped by the great mixture of races and people unable to understand each other. This is gradually being changed as the present generation of young people comes into adulthood. (Fig. 48.) Even under existing conditions, however, the extension service has made a remarkable showing.

Rat-Control Campaign

In the Kona region of the island of Hawaii, rats have been a serious pest on coffee farms, most of which are operated by Japanese. It is estimated that in that region rats take an annual toll of at least $100,000. Before the beginning of the extension work this had been accepted as something impossible to be controlled. The county extension agent in 1929 organized a rat-killing campaign through the

boys and girls' clubs and the campaign accounted for 3,000 rats in a very brief period. This was repeated in 1930 and more than 10,000 rats were disposed of. The estimated saving in a year as a result of this campaign amounted to $50,000.

On the island of Kauai the county extension agent cooperated with the rice growers. This industry, which was once of considerable importance in the Territory, has been rapidly disappearing due to a number of causes, among others devastation by the rice borer. Control methods have been developed through parasites brought in from the Orient. The county agent procured and released these larval parasites and also instructed growers in the use of light traps.

While Hawaii has some well-managed range pasture lands, there are evidences of overgrazing and the disappearance of native grasses. The county agents have cooperated with the large ranches in conducting cooperative pasture tests.

FIGURE 48.—A girls' 4-H club, meeting with the home-demonstration agent, Kalapana, Hawaii

The islands bring in from the States a large part of the poultry products consumed. There are a few commercial poultry plants but most of the poultry is raised in comparatively small lots. The county agents have assisted poultry raisers in culling, housing, economic feeding, and management. Particularly have they helped them in controlling sorehead, a terrible disease in the Tropics. Mosquitoes are carriers of this disease. Above-ground, mosquito-proof houses are constructed to house the chicks until they are well grown.

Most of all, small farmers need organized marketing. The market situation in the city of Honolulu is deplorable. There is no standardization of varieties, and no attempt has been made to control surplus. As a consequence there are frequent periods of glut and of scarcity. Most of the vegetables are grown by orientals and are the varieties with which they are familiar. The flavor of these vegetables is not relished at first by those not accustomed to them. The extension service is gradually introducing better commercial varieties.

Home-Demonstration Work

Extension work with women also presents unusual difficulties. Very rarely do the rural women speak English. They are isolated. There is little community or social life. They want their children to be American, to eat American food, and to dress in American fashion, and they are proud of their advancement in American ways. It requires much patience to teach these women, but they amply repay it with

affection, earnestness, and faithfulness once their interest is aroused. Imagine the lost feeling an extension agent must have in meeting with a group of 10 or more women when 4 or 5 different languages are spoken, not more than 2 of the group being able to speak to each other, and perhaps no one able to speak to the demonstrator. Such situations must be met. The demonstrations must be simple and tell their own story. The lessons frequently must be translated into 3 Filipino dialects—Visayan, Tagalog, and Ilocano—each as distinct from the other as French from English; and perhaps also into Portuguese, Chinese, Japanese, or Korean. Some of the homes are well furnished (American way) but in most of them there is pathetically little. The home-demonstration agents have shown the women how to make ovens out of 5-gallon oil cans, how to make iceless refrigerators and window coolers. Often the families do not like American vegetables and can not get the oriental varieties. As a result, far too few vegetables are eaten under conditions where they could be produced abundantly. The same is true of fruits. Too little milk is used. Orientals are not accustomed to it and have to learn to like it. Malnutrition and some nutritive diseases exist. Teeth are bad almost universally and sore eyes are a common malady. Much health work has been done by plantation nurses and doctors, but the extension service has been the first to go into the homes and show the women how to cook with their crude equipment so that they will like the vegetables. Racial likes and dislikes have to be understood and observed if progress is to be made. Leaders are being found and are developing enthusiasm and skill in demonstration. The older women adhere to the conventional dress of their native lands but the daughters "go American" and are as proud of pretty clothes as debutantes and want them "made right." Clothing work is popular and many of the girls become deft seamstresses. At the outset much of the extension work with women was necessarily individual, but in the past year home-demonstration clubs have been organized. Women's vacation camps have been held during each of the past two years and are becoming increasingly popular. The women take kindly to games and folk dances and nothing so quickly breaks down racial aloofness and bashfulness as playing together.

Boys and Girls' Club Work

Boys and girls' 4-H extension clubs are popular. The children of all races like these clubs and here there is no language difficulty, as the young people speak English. It is an inspiring sight to witness the enthusiasm of these clubs, made up as some of them are, of native Hawaiians, Chinese, Japanese, and Portuguese, all repeating the club pledge in unison and giving the salute to the flag like the real Americans that they are. There are club camps and picnics on each of the islands and the clubs hold their regular monthly meetings, the children being very punctilious about their parliamentary practice. For the last two years there has been a big Territorial 4-H boys and girls' club camp at the University of Hawaii. During the year 1931 the various clubs earned sufficient money to pay the expenses of their own delegates to the Territorial camp. The clubs are of much the same kind as on the mainland, though there are a few that are peculiar to the islands, such as coffee, taro, frog, and banana clubs. The frog club has become quite popular, as it is a source of ready money. The chief

drawback to boys and girls' 4-H extension clubs is that the children are employed in the canning factories and the fields during school vacations; also, among the Japanese, who compose the largest racial group, the children do double school duty. After the public schools are dismissed, Japanese children then go for a similar period to Japanese language schools. In spite of this, however, the children of this race make up a considerable part of the club enrollment, due to their ambition for education and advancement. In 1929 an island-born Japanese boy represented Hawaii at the National 4-H Club Camp in Washington, D. C. He was accompanied on his trip by a Chinese county agent. In 1930 there were 1,664 boys and girls enrolled in clubs.

William A. Lloyd, *Extension Service.*

FARM Buildings Should Be Repainted Before Wood Weathering Begins

A good paint job is the best insurance against the necessity of early repainting. Use of inferior paint is poor economy. It is hard to distinguish between good cheap paints and poor ones, and the cheap paint must be applied more skilfully if it is to give the best service. Paints of dark color are cheaper and more durable than white or light-colored paints of equal quality.

Good workmanship is even more essential than good paint. Stingy application saves paint at the expense of durability and appearance; uneven application is fatal to both.

The first important change in a new paint coating is the collection of dirt. Discoloration is most conspicuous on white and light-colored surfaces and least noticeable on dark colors and grays. If pride in the appearance of his dwelling decides the owner to repaint it at this stage, one coat of paint every two or three years will be enough.

If the coating does not become dirty enough to call for repainting, there may be a fading of the color, noticeable first on that part of the house or barn most exposed to sunlight. The coating is no longer glossy, and when the finger is rubbed over it, a chalklike powder comes off. Fading is most pronounced in paints of light colors containing large amounts of white pigment, with a smaller amount of coloring pigment.

Even after paint has faded considerably, repainting is not yet necessary except where looks are the first consideration. But it is time to watch closely, because more serious changes may soon set in.

Perhaps the next change is a flaking or tearing loose of small pieces of the coating, leaving the wood beneath bare. It is now high time to repaint. Do not wait for the flaking to leave great areas of wood bare. It is hard to paint such a surface satisfactorily, and there is risk that the new coating will soon fail. (Fig. 49.)

An Early Sign of Aging

In many paints an early sign of aging is the formation of tiny interlacing cracks in the coating. If on looking very closely you can see the wood beneath the cracks, or small yellow spots of iron rust over the nail fastenings, the coating no longer keeps the moisture out effectively, and the time has come to repaint.

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In wood weathering, the most serious form of damage to a paint job, larger cracks become visible, running parallel to the grain of the wood. An occasional board is found to be cupping outward, leaving a gap between it and the board below, or pulling loose slightly at the joint with the corner board. In a badly neglected or abandoned house the boards become roughened, curled, and cracked like dead leaves, and no painter could put a decent coat of paint on them.

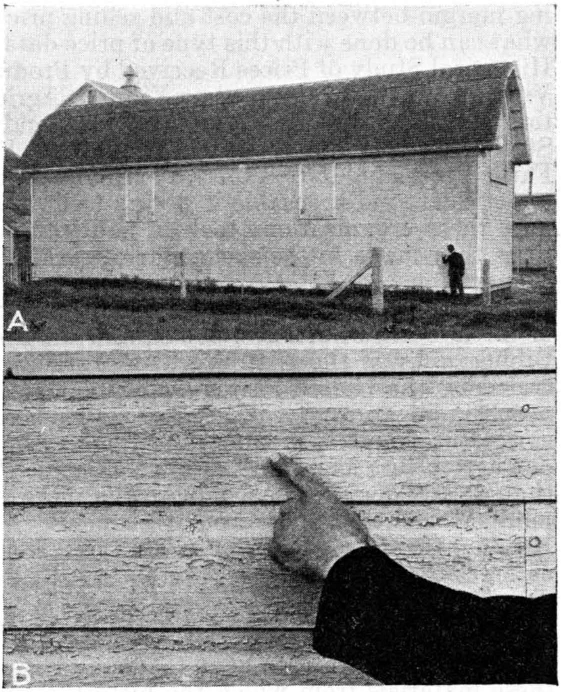

FIGURE 49.—Many a building appearing to be well painted, as the barn in A, on closer inspection will be found to have a paint coating that no longer gives protection, as is illustrated by the close-up B, of the same barn

Flaking coatings can be restored by repainting, but wood that is roughened and twisted by weathering can not be repaired so easily, and it is dangerous to postpone repainting, after the appearance of signs indicating that the coating no longer protects the wood adequately.

Repainting the barn will usually be postponed a year or two after repainting the house, but it should not be deferred until the structure is flying distress signals.

F. L. BROWNE, *Forest Products Laboratory.*

FARMERS' Account Books, Diaries, Etc., Are Often Valuable Research Aids The importance of preserving farmers' account books, diaries, letters, and reminiscences for the use of research workers is being realized increasingly. Of similar significance are country-store account books, mill records, old farm periodicals and rural newspapers, pamphlets, reports and programs of agricultural societies, and pictures of all phases of rural life. These commonplace documents of the past are the necessary sources of the information used by historians and economists in making analyses of our past agricultural and economic life.

These materials supply research workers with many facts not obtainable elsewhere. They furnish data indicating the course of farmers' standards of living; they show the influence of the competition of various agricultural sections, the changing conditions and wages of farm labor, the ups and downs of various systems of farm management, and the trends of crop acreages. They afford figures on the cost of ferti-

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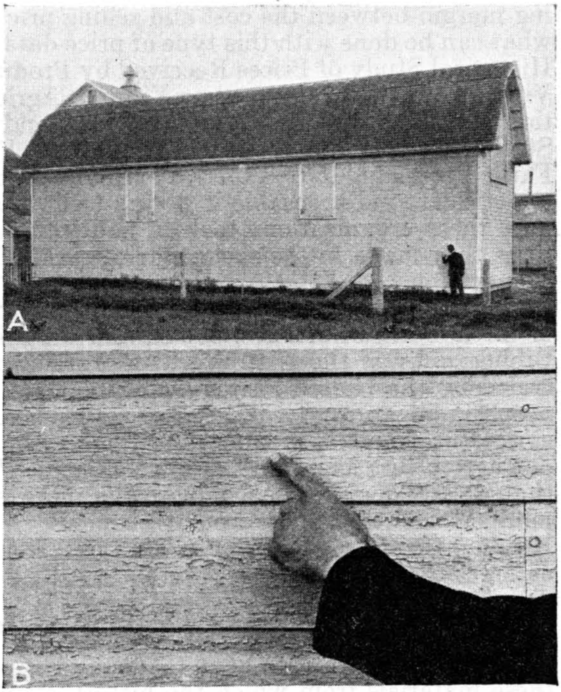

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lizers, machinery, twine, and other supplies and information on yields, disease epidemics, the dates of the introduction of new varieties and breeds, and new cultural practices. The country-store records throw light on the spread between rural and city prices and the changing margin between the cost and selling prices. Notable examples of what can be done with this type of price data are Arthur G. Peterson's Historical Study of Prices Received by Producers of Farm Products in Virginia, 1801–1927, issued as Virginia Agricultural Experiment Station Technical Bulletin 37, and the Maryland Agricultural Experiment Station Bulletin 321 by Roger F. Hale on Prices Paid for Maryland Farm Products, 1851–1927. Pamphlets and reports of agricultural societies are indispensable if we are to have accurate accounts of the part these organizations took in political movements, the contributions they made to the social side of rural life, and their attempts at cooperation.

The analyses by agricultural economists and historians offered to us in the form of articles, books, and bulletins have been listed in a Bibliography of the History of the Agriculture of the United States, issued by the United States Department of Agriculture as Miscellaneous Publication 84. These various studies show us how the present agricultural and economic conditions came about; they emphasize our agriculture as a result of development. They afford perspective, that is, a realization of what are the more permanent and what the more accidental and transient elements of present-day conditions. Reading them broadens our sympathies, steadies our judgments, and enlarges our experiences.

Preservation and Use of Materials

Various organizations have taken, and are taking, steps to preserve these materials from which the history of American agriculture may be written. Nearly all of the State historical societies and commissions have done something, and a few of them have done notable work in this direction. The Department of Agriculture, through its library and the division of statistical and historical research of its Bureau of Agricultural Economics, is cooperating with the Agricultural History Society in developing an agricultural-history collection as the national center of research in this subject. Gifts and information concerning the location of materials for this collection are welcomed. The Business Historical Society with headquarters in the George F. Baker Library, Soldiers Field, Boston, is actively collecting and promoting the preservation of business records, including farm records. The McCormick Historical Association in Chicago has gathered several hundred thousand items. The University of Virginia and the College of William and Mary are assembling materials pertaining to Virginia. At the University of North Carolina, J. G. de Roulhac Hamilton is directing the development of a national southern collection. The University of South Carolina has interested itself in the records of old plantations, and E. Merton Coulter of the University of Georgia has a notable collection of about 5,000 similar documents. The agricultural colleges of Cornell University and the University of Wisconsin are utilizing many old farm, mill, and creamery records in long-time price studies. The State Historical Society of Wisconsin and the Minnesota Historical Society have a considerable number of farmers' diaries and similar documents. In the South-

west, T. C. Richardson, field editor of Farm and Ranch, is head of a committee of the Texas Agricultural Workers' Association which is gathering and indexing material bearing on the agricultural, social, and economic development of Texas. (Fig. 50.)

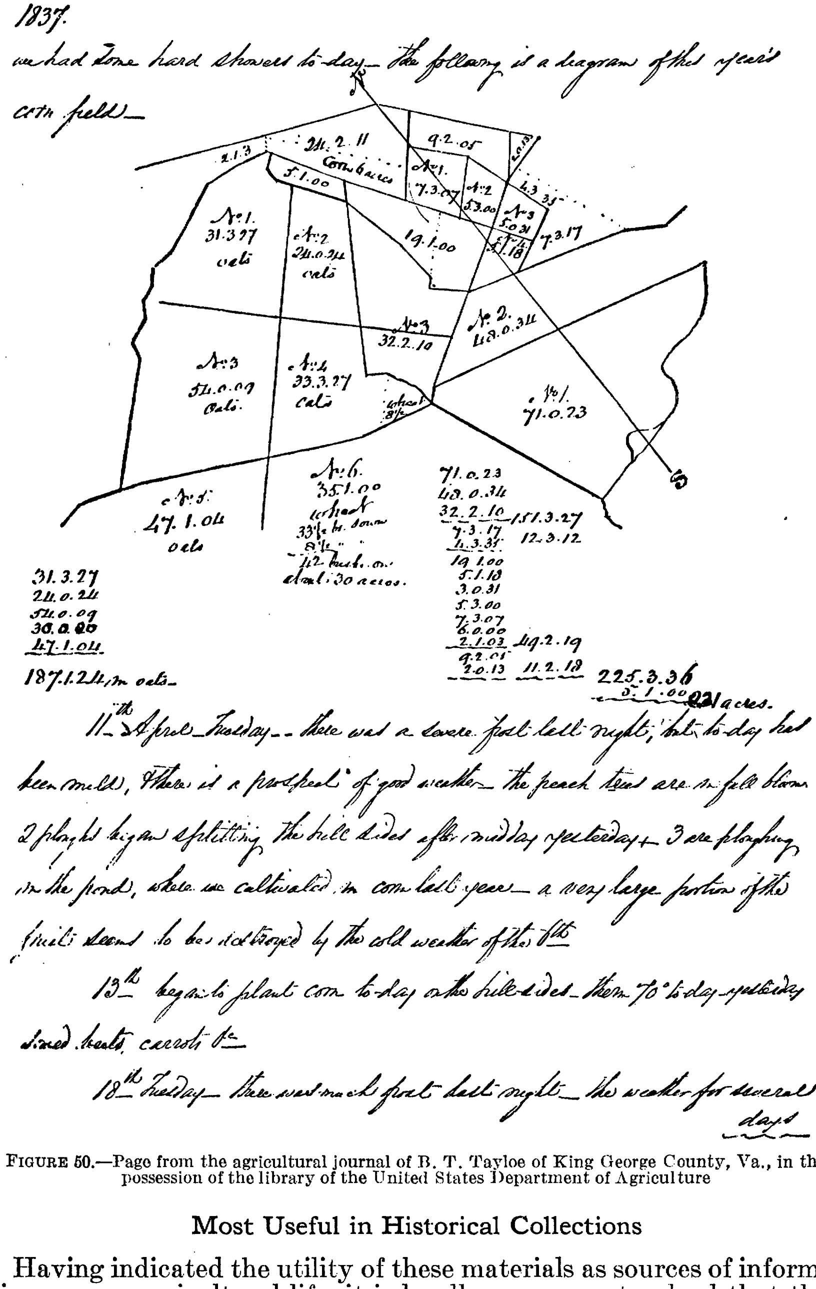

1837.
we had some hard showers to-day — the following is a diagram of this year's corn field —
187.1.24 in oats —
225.3.36
221 acres.
11th April — Tuesday — there was a severe frost last night; but to-day has been mild, & there is a prospect of good weather — the peach trees are in full bloom
2 ploughs began splitting the hill sides after midday yesterday & 3 are ploughing in the pond, where we cultivated in corn last year — a very large portion of the fruit seems to be destroyed by the cold weather of the 6th
13th began to plant corn to-day on the hill-sides — therm 70° to-day — yesterday sowed beets, carrots &c
18th Tuesday — there was much frost last night — the weather for several days

FIGURE 50.—Page from the agricultural journal of B. T. Tayloe of King George County, Va., in the possession of the library of the United States Department of Agriculture

Most Useful in Historical Collections

Having indicated the utility of these materials as sources of information on our agricultural life, it is hardly necessary to plead that they be given to historical collections. To preserve them is to show grati-

tude—an appreciation of the generation whose labors are therein recorded. It is also doing a great service to research workers, for they can use them to significant advantage. While the materials may possess a certain value to their owners, their perpetuity should not be menaced by failure to take steps to preserve them from destruction by fire and other disasters. It is hoped that readers of this article who have or know of materials of the kind here discussed will aid historical and economic research by giving them to historical collections or depositing them with such collections. There they will be classified, filed in fireproof cases, and made forever accessible to research workers.

EVERETT E. EDWARDS, *Bureau of Agricultural Economics.*

FARM Prices and Incomes Reflect Business and Financial Conditions The general depression of 1930 and 1931 is one of many that have almost periodically marred the industrial and agricultural progress of the United States. Most farmers remember the previous major depression of 1920–21 when prices of farm products fell drastically and left many

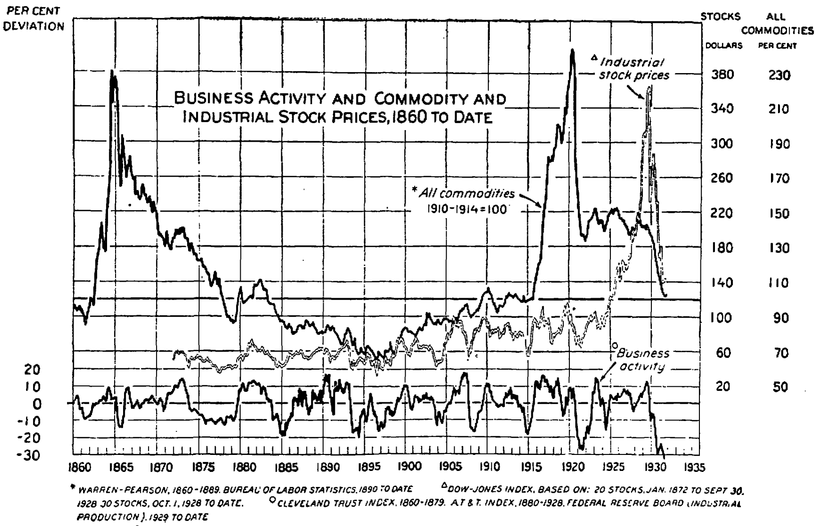


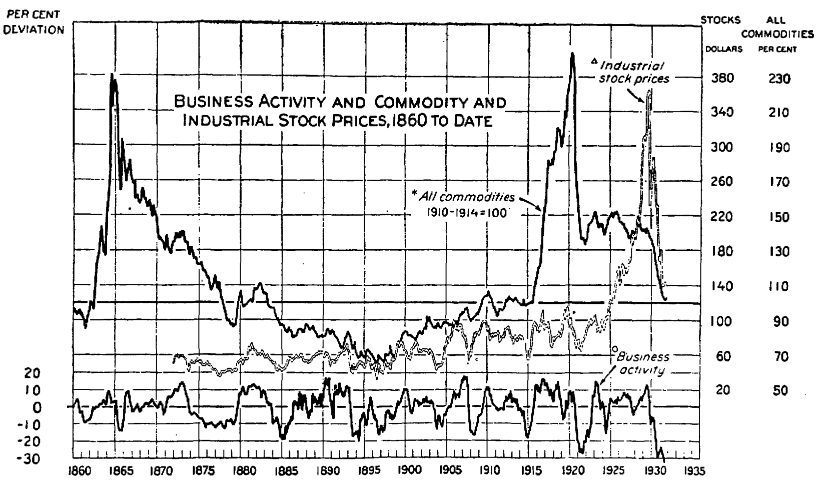
FIGURE 51.—The business depression of 1930–31 is one of many that have marked the industrial and agricultural progress of the United States. Like those of the 1870's, 1890's and 1920–21, it is characterized by a drastic decline in commodity prices, both agricultural and nonagricultural

with debts incurred during the hopeful prosperous years of 1918–19. Others may remember the business depression after 1893 when prices fell to abnormally low levels, leaving farmers stranded with high debts and expenditures. And a few may recall the protracted decline in prices during the long depression after 1873. Many other depressions (fig. 51) have intervened between these major ones but these three were more nearly like the present one in that the greatest damage done to agriculture came as the result of great reductions in farm prices and in farm incomes.

tude—an appreciation of the generation whose labors are therein recorded. It is also doing a great service to research workers, for they can use them to significant advantage. While the materials may possess a certain value to their owners, their perpetuity should not be menaced by failure to take steps to preserve them from destruction by fire and other disasters. It is hoped that readers of this article who have or know of materials of the kind here discussed will aid historical and economic research by giving them to historical collections or depositing them with such collections. There they will be classified, filed in fireproof cases, and made forever accessible to research workers.

Everett E. Edwards, *Bureau of Agricultural Economics.*

FARM Prices and Incomes Reflect Business and Financial Conditions The general depression of 1930 and 1931 is one of many that have almost periodically marred the industrial and agricultural progress of the United States. Most farmers remember the previous major depression of 1920–21 when prices of farm products fell drastically and left many



* Warren-Pearson, 1860–1889. Bureau of Labor Statistics, 1890 to date. △Dow-Jones index, based on: 20 stocks, Jan. 1872 to Sept 30, 1928. 30 stocks, Oct. 1, 1928 to date. ○Cleveland Trust index, 1860–1879. A. T. & T. index, 1880–1928. Federal Reserve Board (industrial production), 1929 to date.

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Between June, 1920, and June, 1921, the level of all farm prices in the United States was reduced by more than one-half (from 234 per cent of pre-war prices to 110 per cent). Between October, 1929, and October, 1931, they were again reduced by more than one-half (from 140 per cent of pre-war prices to 68 per cent). In this depression as in the others the falling prices made farm mortgages, other debts, farm taxes, and even current operating expenses additionally burdensome.

The effect of the business depression is readily seen in the gross income from the total agricultural production of the three seasons 1929, 1930, and 1931. For the production of 1929, when the country was generally considered to be in a state of prosperity, with very little unemployment and nearly everybody happy and hopeful, farmers received a gross income of $11,900,000,000. In 1930, the total farm production was about 2 per cent less than in 1929, but prices, instead of being higher as they normally are for smaller production, fell sharply as the 1930 depression developed here and abroad. The result was that farmers received only $9,300,000,000 for a smaller volume. In 1931, the total production was somewhat larger than that of 1930, but prices, still affected by the business depression, continued to still lower levels greatly out of proportion to the larger output of such cash crops as cotton, corn, and potatoes. Consequently gross farm income was further reduced from $9,300,000,000 in 1930 to $6,900,000,000 in 1931. The reduction in two years amounted to more than 40 per cent.

Certain Expenses Lower

Part of this decline in gross income in 1930 was offset by somewhat lower prices of farm supplies and farm labor, but farm taxes and interest on farm debts remained practically unchanged. The effect was an abnormally low net income barely sufficient to reward the average farmer for the physical labor he and his family put into the 1930 production. He received practically nothing for his capital or for managing the farm. During 1931, prices of goods bought by farmers fell still more. Farm wages also declined again as more city people joined the ranks of the jobless, some of them seeking jobs on farms. But taxes and interest remained practically at their previous high levels. Consequently the 1931 returns from agricultural production were insufficient to give the average farmer either an adequate reward for his labor or for his capital. In this respect the 1931 business depression treated farmers even worse than did the 1921 depression.

Specific Results of the Depression

What are some of the specific ways in which the 1930–31 business depression here and in other countries registered itself in lower farm prices and in lower net farm incomes? In the case of cotton the reduction in industrial activity which set in after June, 1929, was accompanied by a reduction in the domestic mill consumption of cotton. (Fig. 52.) This reduced industrial demand, together with similar developments abroad, brought about an accumulation of unused cotton, and a drastic drop in the price of raw cotton from 17.9 cents per pound in June, 1929, to 7.7 cents in June, 1931. By this time much of the cotton goods in retail stores had been consumed,

and prices had fallen so low that mill consumption of cotton here and in other textile centers increased. For similar reasons cotton consumption expanded during 1921 while business in general was still depressed. The favorable growing season of 1931, however, improved crop prospects and more than offset a 10 per cent reduction in cotton acreage. By October 15 the farm price of cotton had fallen to 5.3 cents per pound, the lowest in over 30 years.

The consumption of tobacco was also materially affected by the decline in industrial activity. For example, in recent years it has been usual for cigarette consumption to increase anywhere from 3,000,000,000 to 13,000,000,000 cigarettes per year depending on the condition of business in general. (Fig. 52.) But in 1930, for the first time in many years, there was practically no increase and in 1931, as business conditions became still more depressed, cigarette consumption actually fell below that of 1930 by about 4,000,000,000. This failure to make the usual expansion in cigarette consumption in 1930, and the actual decrease in 1931, together with reduced demand in other uses of tobacco, were of course reflected in lower prices of tobacco received by the grower.

For somewhat similar reasons producers of food products received lower prices in 1930 and 1931 than in 1929. Among the food commodities we find some instances where the effect of the depression was to curtail consumption. In others, prices fell because consumers, though purchasing the same quantities, were unable to pay as much as formerly. In the case of butter, the reduced purchasing power of consumers in the fall of 1929 brought about an accumulation of storage holdings which helped to bring about very low prices in the winter of 1929–30. (Fig. 52.) Meat animals serve as a good illustration of commodities the prices of which fall because consumers, while continuing to take about the same quantities, are unable to pay as much as formerly because of reduced incomes. During the past 11 years there has therefore been a fairly close relation between food prices in the United States and business conditions as reflected in factory pay rolls. (Fig. 52.)

Price Changes and the Business Situation

The prices of foods which are largely sold in the domestic markets and the purchasing power of domestic consumers as indicated by factory pay rolls, both experienced the boom of 1920, the great depression of 1921, the recovery of 1923, and the two cyclical fluctuations between 1924 and 1930. In 1923 food prices failed to rise as much as the recovery in the business situation warranted, but this failure was the result of burdensome supplies of food products. Another difference occurred in 1927 when factory pay rolls reached their low point a few months after food prices did. The greater general rise in these food prices since 1924 than that shown by factory pay rolls is due to the marked advances in beef prices due to a shortage of cattle, the peak of the beef-price cycle occurring in the last part of 1928. In spite of these differences, however, there has been a very definite reflection of the ups and downs in business and of the accompanying fluctuations in the wholesale prices of foods in the United States. Evidently wholesale dealers pay farmers more or less depending on the state of business.

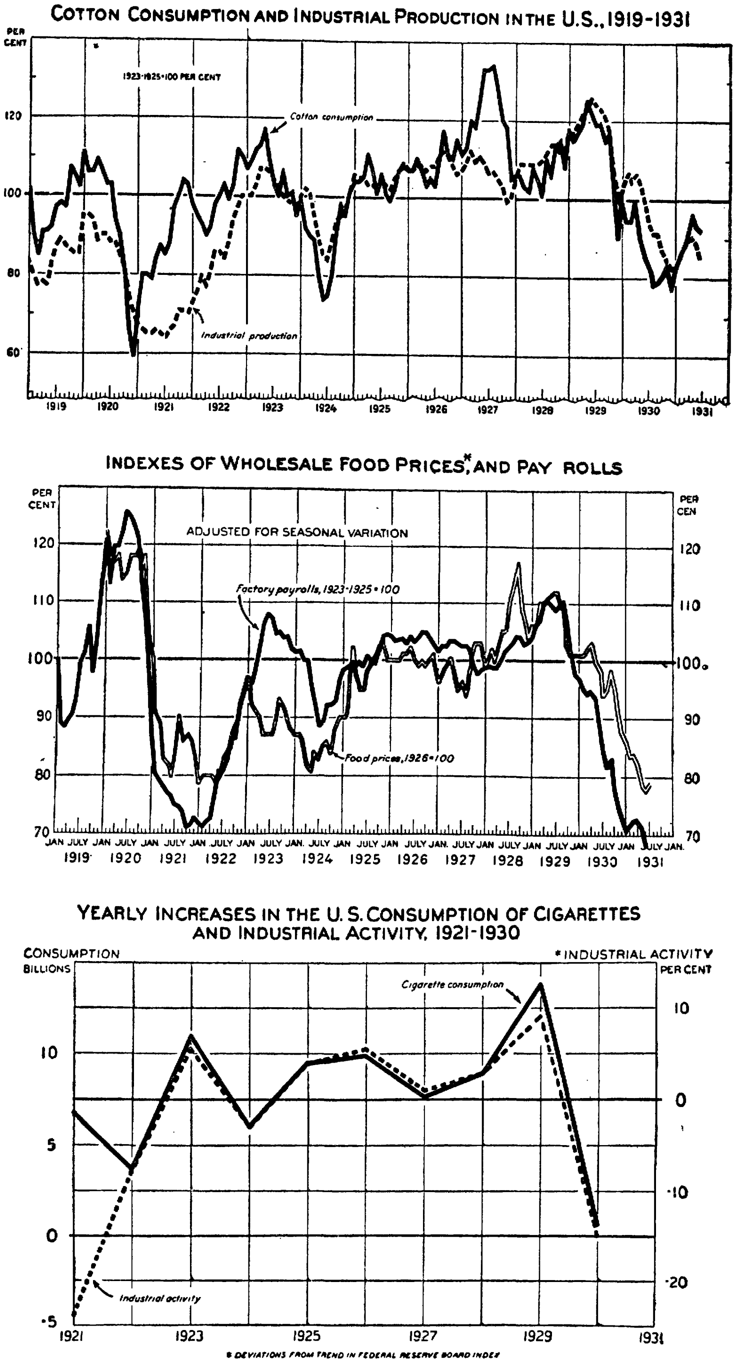

FIGURE 52.—There is a striking resemblance between certain indexes of industrial consumption on the one hand, and price or consumption indexes for certain agricultural products on the other

The ability of dealers in the wholesale markets to pay more or less depends, of course, on what they in turn are able to sell their wares for in the retail markets. This does not, however, mean that there is an exact correspondence between variations in wholesale and retail prices. Sometimes several weeks or months may elapse before prices on the retail markets are advanced or lowered in response to business conditions which have already affected wholesale prices. This was true in the fall of 1930 when butter prices to consumers were reduced some time after the reductions in the wholesale price, and a similar lag of retail prices after wholesale prices appears to exist in the case of meats. This failure of retail prices to show a response to business conditions as soon as wholesale prices do, may be due to the fact that retailers are more reluctant to vary their prices and that consumers can often continue to pay or continue to obtain credit for some time after their earnings have been reduced.

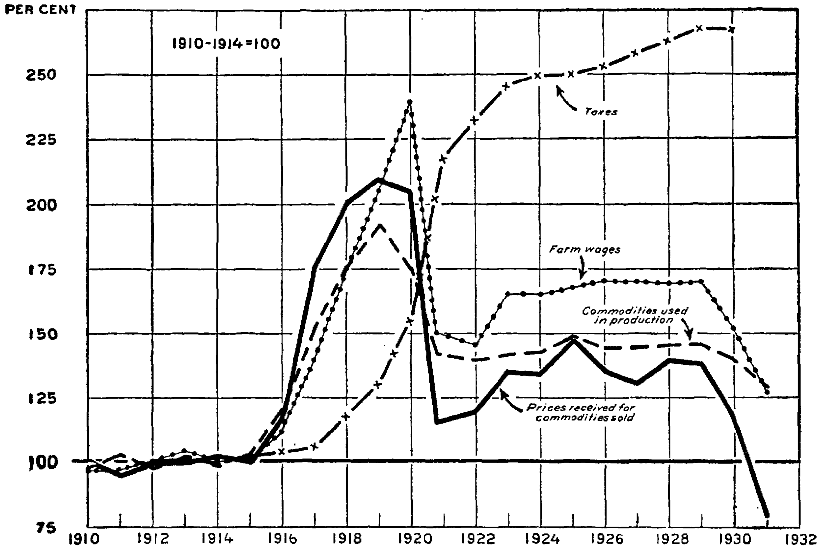

FIGURE 53.—Indexes of prices received by farmers and prices paid for commodities used in production, farm wages, and farm taxes, 1910–1931

The ways in which business affects wheat prices are not as clear as in the case of other food products. More than those of many other commodities, wheat prices are determined by world conditions as well as domestic. Being more of a necessity, wheat is less subject to variations in demand than are other farm products. In the business depression of 1920–21, wheat prices fell as did practically all prices and then continued at low levels until the 1924 shortage lifted them above the general price level. Between 1924 and 1929, their tendency has been downward, with some interruptions due to variations in domestic and foreign supplies. Taking into account domestic supplies and foreign demand for United States wheat, the average price received by growers for the 1929, 1930, and 1931 production was considerably less than they would have received had there been no breaks in the stock market since September, 1929, no business recession, and no general world-wide decline in commodity prices. That difference

is represented by most of the gap between the farm price of wheat in October, 1929, $1.12 per bushel, and a price of only 36 cents per bushel in October, 1931.

Disparity Between Income And Outgo

From the farmers' standpoint, the greatest hardship that is created by major industrial depressions is the wide discrepancy between prices received by farmers and the prices paid by them, the narrowing of the gap between income and outgo. When prices were reduced by nearly 55 per cent in a period of only a year during the 1920–21 depression, the prices of goods bought by farmers for production purposes fell from 192 per cent of pre-war levels (in December, 1919) to 142 per cent (in December, 1921), a decline of about 25 per cent. Farm wages declined from 239 per cent (of pre-war levels) in 1920 to 150 in 1921—a drop of 37 per cent. Taxes on farm property actually advanced from 155 per cent of pre-war levels in 1920 to 217 per cent in 1921 or an increase of 40 per cent at a most inopportune moment.

The 1930–31 depression has again widened the disparity between certain farm costs and farm receipts. During the 2-year interval between October, 1929, and October, 1931, when farm prices were cut in half and gross returns were reduced by about 40 per cent, prices of commodities used in farm production declined from 146 per cent of pre-war levels to about 123, or about 15 per cent. Farm wages, as in the 1920–21 depression, again declined more than the prices of commodities used in production, the decline in this case being from 174 per cent of pre-war levels to 113 per cent, or a drop of 36 per cent. But taxes on farm property, which reached a post-war peak of 267 per cent of pre-war levels in 1929, remained practically unchanged as prices of most commodities and services fell. The total farm-mortgage debt during the 1930–31 depression was also greater than during the 1920–21 depression and this has meant a greater drain on shrunken farm receipts. It is the failure of these and other cost items to contract when receipts are being halved by financial conditions and decreased demand, and the necessity of keeping the farm running, that leave the average farmer with no net income for his capital and labor during periods of industrial depressions.

L. H. Bean, *Bureau of Agricultural Economics.*

FIRE Control Motorized in the Lake States Forest-Land Area Suppression of forest fires is beginning to reflect the increasing use of the gasoline motor. Fire fighters no longer rely entirely upon man power and hand tools. The Lake States, having relatively smooth topography, a large mileage of roads, and numerous lakes and streams, favor the use of such motor-driven equipment as trucks, tractors, and pumps.

Fire fighters travel mainly with trucks. The single fire guard or smoke-chaser may use a light car with a "pick-up" body. It will carry from one to four men besides himself, and tools for the party. Tools commonly include shovels, axes, a 5-gallon hand pump equipped with shoulder straps, water pails, and perhaps an extra supply of water in 10-gallon cans.

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Where roads are good, or a larger crew is required for initial attack, 1½-ton trucks are used. These trucks carry 5 to 10 men, and tools for twice as many. They transport 100 gallons of water or more, a power pump and hose, saws for felling snags, a plow, food, mess equipment, and blankets. A type used in the national forests of the Lake States, and by the State of Minnesota, has compartments in both sides of the body, to separate such unmixable articles as axes, emergency rations, and gasoline. The trucks are customarily painted a bright red like city fire trucks.

Speed of Attack All-Important

Speed of attack is all-important and good roads enable fire fighters to reach many fires while they are still small enough to be easily controlled. But motors afford power, as well as speed. Where water is plentiful motor-driven pumps often do work impossible for men with hand tools.

An especially promising unit for checking fires is the tractor and plow. Even in heavy going, where several men must clear out fallen trees to let the tractor through, this unit will still build control line faster and better than the same number of men could with mattocks and shovels.

Fire control is greatly facilitated by previously prepared fire breaks, cleared to mineral soil. Where such breaks are parallel to roads the discarded cigarettes of careless drivers fall where there is little or no inflammable vegetation. By using powerful tractors and graders the cost of building such fire breaks is reduced below that of work done with plow and disk.

These developments probably presage many others which will gradually be substituted for hand labor in the struggle for more adequate fire control.

CROSBY A. HOAR, *Forest Service.*

FLIES Aid Surgeons in Combating a Persistent Bone Disease of Man

The common blowflies have generally been regarded as pests, or at best only as scavengers. Recently, however, they were made to serve a useful purpose when the late Wm. S. Baer, a noted bone surgeon connected with Johns Hopkins University, introduced the blowfly maggot into surgery.

The story of how Doctor Baer began to use maggots in the treatment of osteomyelitis, a grave bone disease from which about 10,000 Americans are suffering, is exceedingly interesting. During the World War, Doctor Baer, who was a surgeon with the expeditionary forces, noted the condition of two soldiers who had been severely wounded and had lain on the battle field for nearly a week. The wounds of these soldiers were full of maggots, but when they were cleaned out the surgeons were impressed with the freedom of the wounds from infection. The men recovered with unexpected rapidity despite their long exposure and harrowing experiences. On the other hand, high mortality occurred among other men, suffering from similar wounds, who were promptly admitted to the hospital and given the best surgical treatment then known. About 10 years later Doctor Baer decided to try putting his findings into practice. Some cases were chosen which were not healing well after operation and a number of

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common blowfly maggots were introduced. The results were very encouraging. Doctor Baer soon decided that he must make sure that the larvæ used in wounds were free from dangerous germs. He also found difficulty in having an abundant supply of larvæ available at all times, especially during the winter.

Entomologists Aid in Producing Aseptic Maggots

The suggestions of entomologists were of value in the early developments, and later a number of entomological problems were undertaken by the Bureau of Entomology in cooperation with Docter Baer, his associate Miss E. Knight, and other surgeons who had adopted this method of treating osteomyelitis. As a result of this work a very satisfactory method has been developed for producing maggots that are free from disease organisms. This method involves soaking the fly eggs in a disinfectant which will kill the germs but will not prevent the normal hatching of the eggs. The larvæ are reared on sterile food in sterile containers. The food chosen is not very nutritious and therefore keeps the larvæ healthy without causing them to grow much. In this way they may be kept for several days and then, while still small, be transferred to a wound. (Fig. 54.) In the meantime, to determine whether any germs have escaped the sterilizing process, a culture is made from each lot of larvæ and any lot which shows contamination is discarded and therefore never reaches the surgeon. As an additional safeguard against dangerous organisms, the flies that lay the eggs are themselves reared from sterile eggs and are fed sterile water and clean food and kept under reasonably aseptic conditions.

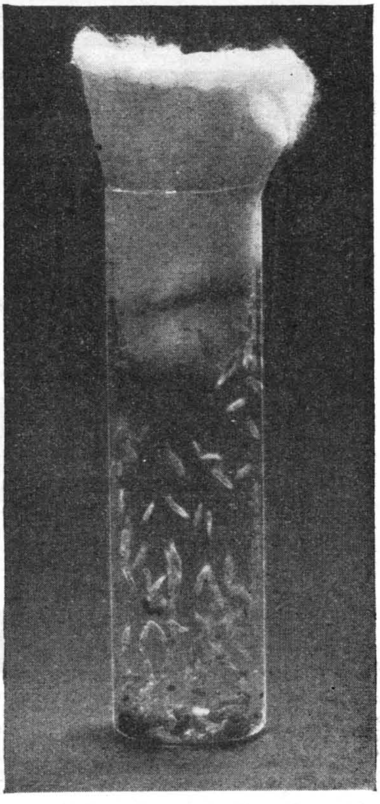

FIGURE 54.—A mass of sterile maggots in a sterile bottle, ready to be removed and placed in wound by the surgeon

The effect of this artificial type of food on productivity and vitality of the subsequent generations is being studied. Investigations are also being conducted to determine what foods are best for the larvæ, the sunshine requirements of the flies, and the conditions of temperature and moisture which give best results. In this work, quite contrary to usual desires with reference to insect pests, high productivity and maximum vitality are sought.

Another problem with which the entomologist, as well as the surgeon, is concerned, is the manner in which the beneficial results are brought about by the maggots. The present indications are that the maggots not only eat away the dead and diseased tissue, leaving the healthy tissue, but also in some way check the multiplication of the

disease germs in the tissues and permit normal healing. To aid in clearing up this problem a more complete knowledge of the physiology of the maggots is being obtained. It is barely possible that this information can be used in the production of a substance which can be applied to the wounds and that we can thus avoid introducing the live maggots.

The work thus far done indicates that any one of several species of our common blowflies may be used in the treatment of osteomyelitis. Those most commonly employed now are the black blowfly and one of the green-bottle flies, known scientifically as *Phormia regina* Meigen and *Lucilia sericata* Meigen, respectively. These species are sometimes pests of livestock, as they infest soiled wool on sheep. Just what species of blowfly will be most effective has not been determined, but the ease with which the green-bottle fly can be reared and handled makes it a favorite in most laboratories.

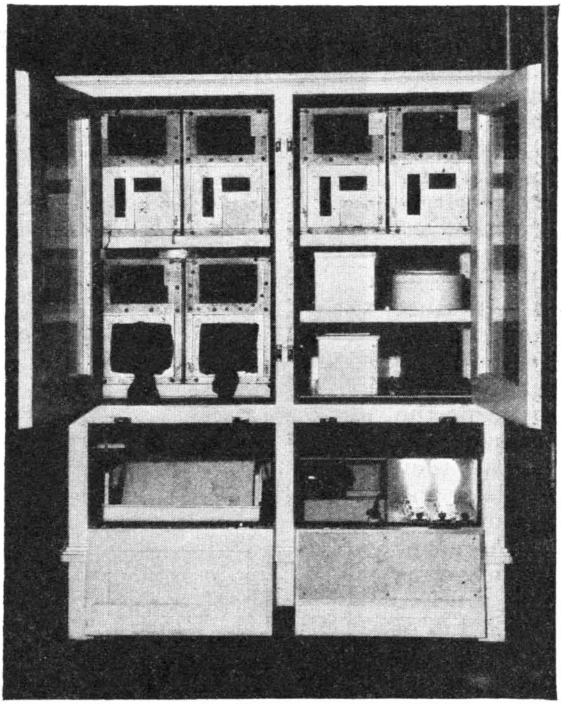

FIGURE 55.—A type of cabinet used in rearing flies and larvæ under controlled temperature and humidity. The doors are opened to show cages and containers. In the lower compartments the heat is supplied by electric-light bulbs at the right; the warmed air is circulated by means of the fan in the middle and is blown over the moist cloths in a pan of water at the left

The facts that the larvæ of a certain species of blowfly, the screw-worm fly (*Cochliomyia macellaria* Fab.), is a destructive pest of livestock in the Southwest and that numerous cases are on record in which it has attacked man have led many people to fear the maggot treatment of osteomyelitis. There is no danger of such destructive effects, however, if the screw-worm fly is carefully avoided.

For the production of larvæ for the surgeon, the flies are confined in cages in cabinets in which the temperature is kept fairly constant at about 80° F. and the humidity at about 50 per cent. (Fig. 55.) The air is circulated by means of a small fan. The flies are fed sterile sugar water and ripe banana, or a mixture of honey, yeast, egg, and water, although considerable range in diet is possible. At frequent intervals a small piece of clean lean beef is supplied and on this the flies lay their eggs. (Fig. 56.) These eggs are removed and treated with a disinfectant as described, if they are to be used by the surgeon. If they are to produce breeding stock they are put on a piece of meat and kept in a warm ventilated cabinet until mature. The maggots reach full

growth in about five days and crawl away from the food to pupate. The maggot container is then put in a larger one containing sand or sawdust, and in this the larvæ pupate. The adult flies emerge in about a week and are put in the gauze-covered cages for further use.

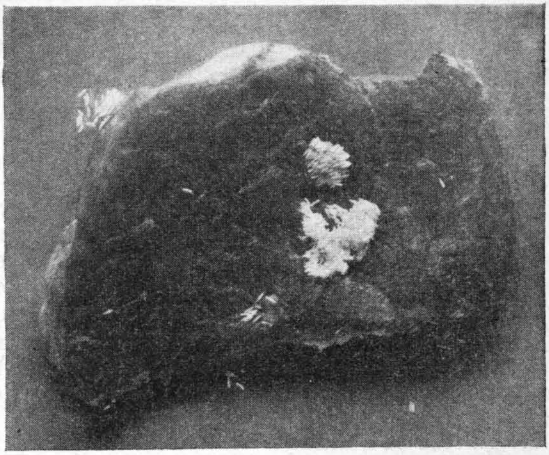

FIGURE 56.—Clusters of eggs laid on a piece of meat. The eggs are ready to be removed and sterilized

Maggots Thoroughly Clean Out the Wound

In following Doctor Baer's method the surgeon performs an operation just as heretofore. A large incision is made, the dead and diseased bone is removed as thoroughly as possible, and a dressing is applied. A few days later, when bleeding has ceased, this dressing is removed and a number of maggots are introduced. (Fig. 57.) When these maggots become full grown they are washed out and, either immediately or a day later, another lot of maggots is put in. This treatment is continued until the wound is

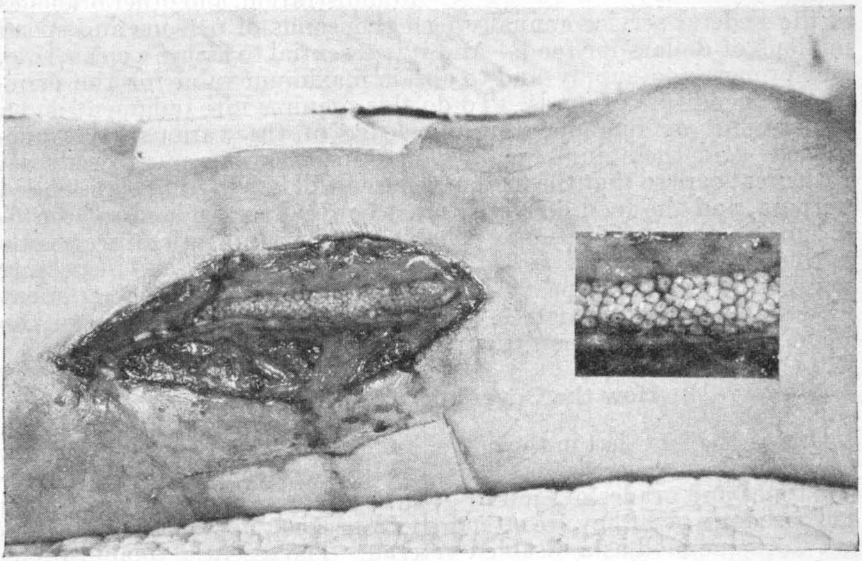

FIGURE 57.—An open wound in upper leg, showing maggots feeding upon the dead bone deep in the wound. The inset is an enlarged portion of the wound and shows the maggots, about life size, closely packed together and feeding with heads downward. This is typical of their manner of feeding in deep wounds

nearly healed. After the larvæ are introduced a cage with sponge-cork sides and a screen top is usually applied with adhesive tape to keep the larvæ from escaping. They must have air and not too much fluid in

the wound. This means that the wound must be kept open and the surplus discharge drained off. When the larvæ are first introduced the wound is swarming with germs, which, however, decrease rapidly in the presence of the maggots. The healing is accomplished usually in a few weeks, and the scars remaining are much less conspicuous than those caused by other methods of treatment.

Recurrences of osteomyelitis are ordinarily very common. Some patients suffer for years and many operations are necessary. The maggots, however, appear to clean out the wound so thoroughly as largely to prevent recurrences.

Despite its repulsive features, the Baer method is being widely adopted. At the present time more than a score of hospitals in various parts of the country are using it with satisfaction.

Although osteomyelitis is the only disease in which this treatment has been thoroughly tried, there are indications that it may serve a useful purpose in the treatment of other suppurating lesions in both man and animals and perhaps may benefit cases of tuberculosis of the bone, if complicated with other infections. When we think that thousands of patients are affected by osteomyelitis and that a large percentage of them are children, we must conclude that the blowfly is a real benefactor of man.

F. C. Bishopp, *Bureau of Entomology.*

FOOD and Drugs Act's Requirements Apply to U. S. Government's Buying

Few people think of Uncle Sam as a buyer of foods. It is true, however, that the Army, Navy, Veterans' Administration, and other branches of the Federal service annually feed thousands of persons and spend millions of dollars for food. And it is essential to assure a clean, safe, and proper food supply and to obtain maximum value for the enormous expenditure of funds. To do this requires rare judgment and a background of fundamental knowledge of the various foods purchased—and their number is legion. Specifications must be drawn with great care so that the food purchased will be suited to its intended purpose, and the food delivered must be rigidly examined as to conformity to the specifications. The Department of Agriculture assists in this purchasing work, acting in an advisory capacity and inspecting samples. During the past fiscal year 4,426 samples of Government food supplies were examined in the Washington laboratories of the Food and Drug Administration.

How the Government Selects its Food

Due to the fact that in the official family there is a diversity of class, occupation, and geographical location, it is necessary to provide different types and grades of food in order that they may be suited to the purpose for which they are intended. A prisoner, for example, will not get the same food as a disabled veteran. The essential qualifications and requirements are fully set forth in specifications drafted by a committee appointed for the purpose. Copies of the specifications are forwarded to brokers and manufacturers throughout the country and they are invited to submit bids and also samples of the products they propose to deliver in fulfillment of a possible contract. The samples are judged on the basis of the specification requirements, and the con-

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F. C. Bishopp, *Bureau of Entomology.*

FOOD and Drugs Act's Requirements Apply to U. S. Government's Buying

Few people think of Uncle Sam as a buyer of foods. It is true, however, that the Army, Navy, Veterans' Administration, and other branches of the Federal service annually feed thousands of persons and spend millions of dollars for food. And it is essential to assure a clean, safe, and proper food supply and to obtain maximum value for the enormous expenditure of funds. To do this requires rare judgment and a background of fundamental knowledge of the various foods purchased—and their number is legion. Specifications must be drawn with great care so that the food purchased will be suited to its intended purpose, and the food delivered must be rigidly examined as to conformity to the specifications. The Department of Agriculture assists in this purchasing work, acting in an advisory capacity and inspecting samples. During the past fiscal year 4,426 samples of Government food supplies were examined in the Washington laboratories of the Food and Drug Administration.

How the Government Selects its Food

Due to the fact that in the official family there is a diversity of class, occupation, and geographical location, it is necessary to provide different types and grades of food in order that they may be suited to the purpose for which they are intended. A prisoner, for example, will not get the same food as a disabled veteran. The essential qualifications and requirements are fully set forth in specifications drafted by a committee appointed for the purpose. Copies of the specifications are forwarded to brokers and manufacturers throughout the country and they are invited to submit bids and also samples of the products they propose to deliver in fulfillment of a possible contract. The samples are judged on the basis of the specification requirements, and the con-

tract is awarded to the lowest bidder whose product meets these requirements.

The contract let and the supplies delivered, the question arises: Do the goods comply with the specifications and does the quality of the delivery measure up to that of the sample submitted? Practically all Government food specifications contain a clause to the effect that all deliveries shall conform to the provisions of the Federal food and drugs act. It is possible, of course, for a commodity to be in compliance with the law and yet be unsatisfactory for a certain purpose. This is due to a differentiation in quality of the foods above the legal requirements. For example, canned fruit is usually graded as fancy, choice, and standard, the last grade being the lowest. If the contractor furnished a grade lower than the specifications called for, a fraud would be perpetrated against the Government; but, if the fruit were clean, wholesome, and properly labeled, no violation of the food and drugs act would occur.

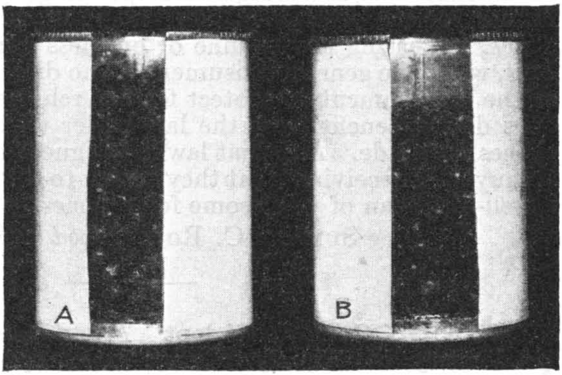

FIGURE 58.—A, Minimum permissible fill; entire contents occupy but 90 per cent of the volume of the closed can; B, improperly filled can; entire contents fill less than 90 per cent of the volume of the closed can

Often a simple inspection—or what the analyst terms an organoleptic test—is sufficient to decide the matter. Then, again, the product can be judged only after careful analyses by chemists and bacteriologists having all the facilities of modern, well-equipped laboratories at their disposal. Many such laboratories are located throughout the United States. Analyses of food supplies for the Veterans' Administration alone require the constant attention of a corps of trained chemists and bacteriologists. These supplies include practically every known food that comes in a can, besides such staples as flour and cereal foods, cocoa, coffee, gelatin, and dried fruits.

Purpose and Value of Testing Foods

This brief article will make no attempt to enumerate all the tests made to ascertain whether or not the various commodities are in compliance with the specifications. There are a few requirements, however, which deserve special mention. For example, the Government insists that canned-goods containers be well filled with food, a requirement made by the food and drugs act. Foods are frequently adulterated with water. Water is a cheap adulterant, costs money to transport, and the law demands that its use be held to the minimum necessary for proper packing. So canned goods are carefully checked for the fill by the measuring of the head space, that is, the distance from the top of the can to the food level, and by draining the contents of the can on a screen of specific dimensions for a definite length of time. With price and quality approximately equal, it is obvious that a saving results to the Government only when well-filled containers are accepted.

Fat is the valuable constituent of cocoa. Cacao fat has food value and its monetary value far exceeds that of the other constituents of cocoa. Breakfast cocoa must contain not less than 22 per cent of fat, and department chemists see that this requirement is met. In many cereals and farinaceous products protein plays an important part, and here again the chemist assures himself that the protein content is what it should be.

As already said, the direct purpose of the testing of foods is to enable the Government to buy clean, wholesome food of the grade and quality desired, at reasonable prices. The effects of this work are, however, far-reaching, farmers and the food industries, as producers, being benefited. How is the farmer helped? The Federal food and drugs act, the power which motivates this work of testing Government food, requires a well-filled can. This necessitates the production of large quantities of raw materials, requiring a correspondingly greater demand upon the farmer for his products. The well-filled can increases buyer confidence, increasing the volume of business done in food commodities. And, while the general consumer gets no direct benefit from the efforts of the Government to protect food purchases for its own charges, he does derive benefit from the law under which all Federal food purchases are made. And that law is designed to improve the chances of all buyers of receiving what they expect to get for their money, namely, a well-filled can of wholesome food, honestly labeled.

Sumner C. Rowe, *Food and Drug Administration.*

FOREIGN Countries Adopt Variety of Subsidy Plans for Agricultural Relief

Agrarian relief has been an important economic concern of many foreign governments during the decade since the war, but especially since the beginning of the world crisis in 1929. Relief measures have been of two general types. One type has sought to lower production and marketing costs. Improvement of credit facilities, tax relief measures, reduction of transportation rates, provision of better storage facilities, etc., are illustrations of this type. The other type has sought to increase the gross income of the farmers by increasing the prices of farm products. On the whole this latter type has been distinctly the more important, and in this category measures regulating internal and external trade have been of outstanding significance. In the present brief survey, attention will therefore be confined mainly to these latter measures.

Import Restrictions

During the last few years there has been a striking increase in the number and variety of import restrictions designed to increase prices in the home market for the benefit of domestic producers. These have included not only increases in tariff duties but also the employment of more direct forms of restrictions, such as import contingents, government licensing systems, and milling quotas. The system of milling quotas, which involves the establishment by law of stipulated minimum percentages of home-grown grain that must be used in domestic milling, has come into particular prominence during the last year or two.

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What has happened with reference to wheat affords perhaps the best illustration of the rise of import barriers. Since January, 1930, the tariff rate on wheat in Germany has risen from 42 cents to $1.62 a bushel; in Italy, from 74 cents to $1.07; in France, from 53 to 85 cents; in Austria, from 11 to 55 cents; in Greece, from 40 to 55 cents a bushel, and so on. But these additional duties tell only part of the story. German, French, and Italian millers are required by new milling regulations to use chiefly domestic wheat in their flour, so that the actual tariffs imposed on such wheat as is permitted to enter assume a secondary importance. Other countries, namely, the Netherlands, Sweden, Czechoslovakia, Greece, Estonia, Latvia, Peru, and Luxemburg have been employing this same device. More recently the British Government has announced its intention of establishing such a quota for home-grown wheat.

The only countries which do not impose duties on wheat are Great Britain, the Irish Free State, Denmark, the Netherlands, Norway, and Belgium, and the last three of these impose other import restrictions designed to achieve the same ends. In a number of the importing countries, such as Sweden, Norway, Switzerland, Spain, South Africa, Estonia, and Latvia, there is direct price-fixing and rigid governmental control of imports in support thereof. There have been temporary relaxations of import restrictions when domestic supplies were near exhaustion; but in general these foreign governments have assured their domestic producers a greatly preferred position in the home markets.

Wheat Restrictions Typify the Trend

What has happened with reference to wheat typifies the trend for all agriculture. Immediately after the war there was a brief period during which the severe war-time restrictions on trade in agricultural products in Europe were somewhat abated and this was followed by a period of increased protection. Until 1929, this protection had for the most part taken the form of tariff increases which did not raise agricultural tariff levels much above those that had prevailed prior to the war. Since the collapse of world prices in 1929, however, the restrictions on imports have rapidly tightened. In Germany, the duties on cereals, meats, and other farm products have been increased several times. In France, Italy, Switzerland, Spain, Portugal, Chile, Mexico, Cuba, Canada, and in many other countries, there have been more or less comprehensive upward revisions of the duties on agricultural products, and in many of these countries other forms of restriction as well have been applied. Even Great Britain has imposed new restrictions on imports of foodstuffs and has announced her intention of extending them further.

Aids to Exporting Industries

A great variety of measures has been employed to place the agriculture of exporting countries on a more profitable basis. Some of these, such as the international sugar agreement, have been designed to limit world exports and thus to raise the entire level of world prices. Even more directly restrictive, but applying to only a single country, is the Egyptian Government's limitation of cotton acreage. Under recent decrees, the area planted to cotton in the region where Sakellaridis is grown has been restricted to 30 per cent of the total area of land held by any one person. Outside this zone, acreage planted to cotton

is limited to 25 per cent of the total area in the possession of the cultivator.

Most of the government-aid measures in exporting countries, however, have tended to increase exports rather than to diminish them, while at the same time maintaining domestic prices on an artificial level. Most of these measures have tended to promote export-dumping and thus to lower world price levels in the course of the effort to isolate the domestic from the world market. Export bounties and premiums, import-certificate systems (which are, in effect, a type of export bounty), government trading and export monopolies serving as agencies through which the domestic output is segregated for domestic and foreign sale at different price levels—these and other measures have been resorted to in the hope of alleviating distress among producers of crops of which there is an exportable surplus.

Various Export-Dumping Devices

There is a variety of devices the effect of which is to encourage export-dumping at the expense of either domestic consumers, taxpayers, or both. In detail, these measures differ considerably; but essentially this is the effect of all. One group of illustrations is to be found in the measures taken by the Danubian states in aid of their wheat growers. In Hungary, at the beginning of the crop year 1930, a decree went into effect granting to the producers of wheat a tax-credit coupon valued at 14 cents per bushel, of which any portion left after payment of tax arrears was paid in cash to the grower. This device was continued in the crop year 1931–32. An added provision has gone into effect, however, whereby the growers receive a net credit of 29 cents a bushel, half of which consists of the 14-cent tax-credit coupon carried over from the earlier law, the other half being immediately payable in cash. The funds out of which this bonus to the growers is paid are derived from the sale of "purchasing permits" to dealers in wheat at the rate of 48 cents for each bushel purchased. The difference between this sum and the 29 cents credit to the growers goes for refunding to exporters the sums which they have had to pay out for these permits and for an additional premium to them of 16 cents a bushel on their exports. The export business is conducted through an organization which is, in effect, a quasi-governmental monopoly.

In Yugoslavia, the Government exercises complete monopoly over the commercial wheat crop of the country and regulates internal and external trade in such manner as to maintain internal prices above the world level while selling the exportable surplus abroad for whatever it will bring. The Yugoslavian Government has been paying growers a fixed price, ranging according to grade, of from 77 to 84 cents a bushel in 1931–32, while selling wheat abroad for little more than half these prices. In Bulgaria a system is in effect whereby growers receive directly from the Government a guaranteed price of 67 cents a bushel, 70 per cent of which is payable in cash, the remainder in taxation bonds offerable against tax arrears. In Bulgaria, as in Hungary and Yugoslavia, the grain-control system is handled through a central purchasing and exporting organization. In Rumania, the Government pays an export premium of 16.1 cents a bushel.

Treaties to Facilitate Exporting

To facilitate exports the Danubian countries have been negotiating treaties with other European countries designed to secure for Danubian cereals and some other products preferential entry into the markets of these other countries. Some of these treaties provide for reduction of duties on definite quotas of stipulated amounts; others are less definite.

Other instances of export aid may be cited. Poland pays an export premium of 18 cents a bushel on wheat and also premiums on rye and barley exports. In Canada the Government is paying in 1931–32 a direct bonus of 5 cents a bushel (equivalent, at current exchange as of December 31, 1931, to 4.2 cents) to wheat growers in the prairie Provinces. More recently, the Australian Government has adopted a bounty of 4½ pence per bushel (9.12 cents at par and 5.08 cents at current exchange as of December 31, 1931) for this year's wheat crop. South Africa and Southern Rhodesia have established Government controls over the corn-export trade for the purpose of raising domestic prices above the world level. The principles involved are essentially the same as those employed to this end in Yugoslavia and Hungary in respect to wheat. The Government so controls the corn trade as to enable it to segregate supplies for sale in the domestic and foreign markets and to maintain domestic prices above the world level while selling the exported portion abroad at whatever price it will bring.

LYNN RAMSAY EDMINSTER,
Bureau of Agricultural Economics.

FOREST Administration Must Correlate Grazing and Recreation Needs Forest officers responsible for range management and recreation in the national forests are often confronted with the problem of the proper correlation of two forms of conflicting land use—recreation and grazing. In establishing national forests to assure a permanent supply of timber and the protection of valuable watersheds, large areas supporting forage growth, formerly used by livestock, were unavoidably included. The old plan of first come first served, without regard to numbers of livestock or season of use, had resulted in range deterioration and serious erosion. Fundamental principles of range management were immediately put into effect by the Forest Service, and now on all important grazing forests, management plans provide for classifying each range and allotting to it the class of livestock to which it is best suited, regulating the period of use to plant growth requirements, limiting the number of livestock grazed, and giving due consideration to the needs of game animals and other national-forest resources.

The national forests have also been used for a long time for recreation. This use, comparatively small in the beginning, has increased by leaps and bounds throughout practically all of the national-forest regions. In California only a few thousand people used the forests for recreation 25 years ago; now more than 16,000,000 people visit them annually and some 3,000,000 make considerable use of them. This use includes nearly 6,000 municipal camps, auto camps, airplane landing fields, and many other recreational developments, and recreation

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management plans have been developed for each national forest in California.

In developing these plans, correlation with grazing and other uses of national forest lands was necessary. Intensive recreational development and use was confined to the most desirable and accessible areas, while grazing was restricted to more remote areas. Where the class of livestock grazed was in conflict with recreation, a change in the kind of livestock was made.

Aids to Travel Off Beaten Paths

Forage is reserved at suitable and convenient places to facilitate travel with pack and saddle horse off the beaten paths. This is accomplished by the establishment of small pastures along regular routes of travel, placing of short stretches of fence across canyons connecting with natural barriers, recognition of packers engaged in transporting tourists and supplies, and the issuance to commercial packers of permits covering pack and saddle animals.

Under this arrangement thousands of people travel about the national forests annually and enjoy fishing, hunting, recreation, and the scenic beauties of these mountains.

Closely related to grazing and recreation is the wild-life problem. No single use of national forests has greater recreational value and such possibilities for conflict with grazing as the use of ranges by game animals. This is especially true in California because of the variety and number of deer. To provide these animals with adequate food, domestic stock is reduced in numbers on large areas or excluded altogether. More than 2,000,000 acres of national-forest lands in California are given special grazing supervision for this purpose.

With well-developed recreation and wild-life management plans, the use of the national forests in California is increasing rapidly, while the use of the ranges for the grazing of domestic livestock is being maintained.

J. W. Nelson, *Forest Service.*

FOREST-FIRE Protection by Cooperative Agreement Under the Clarke-McNary Law

Cooperative forest-fire protection, in which the Federal Government shares under section 2 of the Clarke-McNary law, contemplates adequate protection of the 417,051,000 acres of private and State forest land outside of the national forests. Forty States, from southern California with its valuable watersheds to Oregon with its immense Douglas fir areas, from Maine's spruce lands to Florida's young pine, have forest land requiring protection, and no one system would fit the different conditions found in these various regions. Responsibility for supervising the cooperative fire-protection work lies with the States, although the work is inspected and the accounts are examined by Federal inspectors.

Organization, financing, and technic of fire control are, as far as possible, fitted to the conditions of each particular State. The generally accepted principle is that private landowners should pay one-half the cost of protecting their forest land, the other half being shared equally by the State and Federal Governments. A few States have

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laws requiring landowners to pay their share; other States depend upon voluntary contributions. In some States, however, the owners are carrying a larger burden than are the State and Federal Governments.

It is generally impracticable to obtain material financial cooperation from owners where forest land is held in small tracts, and public agencies usually assume full responsibility. Financial cooperation from the counties is common in the Eastern States. Under any plan of financing much valuable cooperation is obtained from landowners without cash outlay.

Owners' Protective Associations

In some regions where the land is held in large tracts and the owners have a keen appreciation of the value of the timber and the damage done by fire, owners commonly organize forest-fire protective associations, under the leadership of the States. Assessments to provide funds for use by these associations may be voluntary or required by State law, and the associations customarily manage their own fire-control organizations under a plan mutually acceptable to the association and the State. The work is inspected by the State and the association receives financial aid from the State and Federal Governments.

The West Virginia State law provides that unless the forest-land owner gives satisfactory protection to his land the State may collect 1 cent an acre from him for protection supplied by the State. But because of lack of funds to administer this law, it has not been given State-wide application. However, two large associations covering nearly 2,000,000 acres were formed several years ago. Each member pays into the association 1 cent for each acre of forest land owned by him within the association area. The State obligates itself to pay an equal amount from State and Federal funds. In addition, the counties are required by law to pay the cost of temporary labor and supplies used in fighting fire, when such costs are authorized and the accounts verified by State officers.

Managers are State Employees

The field managers of the associations are employees of the State, which pays most of their salaries. Semiannually each field manager reports on the work and submits a working plan and budget for the next half year, which must be acceptable to the State forester and to the association. Direction of the work is left to the field manager, or district forester, as he is usually called. He must see that lookout towers, telephone lines, and fire tools are in good condition before the opening of the fire season. (West Virginia has a fall fire season in October and November, and a spring fire season in April and May.) He directs and carries on an educational campaign for fire prevention. He observes weather conditions; employs lookouts, rangers, and wardens, and places them somewhat in advance of dangerous fire weather. During bad fire weather he keeps in close contact with the organization, and is alert for critical situations which require shifting of man power or expert direction to prevent large fires with heavy suppression costs.

C. F. EVANS, *Forest Service.*

FOREST-FIRE Protection Involves Detailed Planning of Transportation System The time elapsing between the start of a forest fire and the arrival of fire fighters may mean the difference between quick suppression and a disastrous conflagration. Consequently, the Forest Service, in planning for fire protection in the national forests, must determine for each area the necessary "hour-control," or the maximum time that a fire can safely be allowed to burn in a given fuel type under "average bad" conditions before the first suppression forces arrive. A portion of the hour-control interval is needed for discovering and reporting the fire and for get-away. What remains is available for the firemen traveling to the fire. Hour-control time is determined by the value of resources, the degree of inflammability, and consequent rapidity of action deemed necessary to hold losses below a specified limit.

The objective of the transportation planning is the design of a transportation system, together with the placement plan for protection personnel, which at the least annual cost per unit of area will enable fire fighters to reach any fire within the allowable travel time.

Planning on the basis of reaching an entire area within the prescribed travel time will usually result in a large overlapping in coverage from various protective positions. Also certain relatively small portions can be brought within the allowable travel time only at excessive cost. As a result of balancing costs against benefits, it may be decided in such cases that the instructions for the planning should provide (1) that some definite percentage of the total area shall be within the prescribed travel time, (2) that the area of any unreached block shall not exceed a stated size, and (3) that practically all points in such a block shall be within a different but greater travel time.

Several Layouts May Be Necessary

The desired coverage can usually be secured with several different layouts of transportation facilities and men. Obtaining the best possible combination of men, roads, and trails would be well-nigh hopeless if the cost per square mile and the most efficient distance between firemen had not been ascertained for various combinations of speed of roads, trails, and cross-country travel, allowable travel times, and annual costs for firemen, roads, and trails. The layout upon which the data are based can seldom be completely attained. The data are used as a guide to determine the nearest possible approach to the assumed system in which project costs average those on the ground.

The specifications for building the transportation plan cover the allowable travel time, both first-line and second-line defense, for each fuel type or zone of inflammability within the area.

First-line defense ordinarily consists of one man available to be sent to a fire at any time. More men are used where conditions call for them. Second-line defense bases are those where fully equipped crews of not less than the minimum size required for second-line purposes can be obtained. In the design, speed ratings, and cost estimates, first-line men on or near roads are considered as equipped with light automobiles. For second-line forces, the 1½-ton capacity truck is ordinarily the standard.

The next step in planning the transportation system is to secure field information and data. For each existing road and trail the man making the plan must know the location, speed standard during the fire

season, the cost to raise this standard, and the annual maintenance cost. Similar data are needed on all proposed and possible routes for roads and trails within reasonable cost. Comparable information is needed for water routes. Knowing the present efficiency of the existing system for first and second line defense it is now necessary to develop a planned system satisfying the specifications.

Area that Can be Covered is Mapped

Starting with the first fireman, and using the proper speed for each existing travel route, the area which he can reach within the prescribed travel time is worked out. For instance, if two hours are allowed, and the fireman is located on a road with a speed standard of 15 miles within an hour, he can travel 30 miles in each direction within the allowed time. With a cross-country foot-travel speed of 2 miles he can go out 4 miles on each side of the road opposite his station, 3 miles from a point on the road 7½ miles away from his station, etc.

The area covered by each existing fireman within the allowable time limits is indicated on a map. The next step is a similar mapping of second-line coverage. Every combination of existing routes is utilized.

A computation of the annual cost of the present system is then made. This is based upon the area within the specified travel time for first line defense. For roads and trails, the costs include the annual maintenance charges necessary for protection use plus a percentage of the construction investment required to build to the standard necessary for protection. For firemen, the costs include such portion of wages, including subsistence, as are chargeable to protection. For improvements at firemen's stations, the amount is such portion of the annual depreciation plus annual maintenance as is chargeable to first-line defense.

The planning work so far done has shown to what extent the present transportation system and protective organization fulfill the requirements. The probability is that there will be a great duplication in coverage in certain sections while other sections will be far beyond the travel allowance. Cases of 100 per cent duplication will be infrequent but the maps will show many instances where the coverage can be improved by changing the location of firemen or by raising the speed standard of existing roads.

Means of Improving the System

The next step is to find the best means of improving the system so that it will satisfy the specifications. Maps and transparent overlays are used in working out the best combinations. All possible and proposed routes of travel which seem practicable from a cost standpoint are determined. Men are shifted where insufficient or duplicate coverage dictates such procedure. New positions are introduced where needed. Existing routes are altered in speed if necessary or abandoned if found of negligible value. Possible new routes are utilized when required and assigned the speeds found most economical. The final result should be a coverage for the first-line defense of not less than the minimum percentage specified as acceptable, and a transportation system approximating as closely as practicable in ground plan and speeds the objectives sought.

Starting from the second-line supply points, second-line coverage is worked out by the same methods. It is extremely unlikely that the crew coverage will be satisfactory upon first trial. If it is, the system satisfies the specifications for both first-line and second-line defense. If not, changes must be made to secure the required second-line coverage. The changes will usually be a substitution of roads for trails and an increase in length or speed of planned roads.

It is now necessary to coordinate the first and second line defense plans. Through balancing back and forth between first and second line overlays, the final system is determined. Unit costs are computed in the same manner as for the existing system.

Variations in the method of planning may prove advisable because of unusual conditions. In certain cases, the use of air transport to supplement ground travel may be practicable.

The Final Check

The final check of the plan is made in the field and covers the feasibility of planned routes, correctness of cost estimates, practicability of securing planned speeds at estimated costs, suitability of construction standards, and correlation of planned locations with routes needed for utilization of the forest resources and other purposes.

Effectiveness in expenditure requires close correlation between the transportation plan and the fire detection plan. While both plans could be made independent of each other, there is the possibility of so locating some men that they may serve both for detection and for suppression. When the two plans have been worked out, it appears that it will be relatively easy to determine the communication system that at least annual expense will render adequate service for protection as well as for administration.

T. W. Norcross, *Forest Service.*

Forest Fires Are Often Fought With Water in California

The shovel and ax have always been the standard forest-fire-fighting tools in California. Other tools have been adapted or invented for removing inflammable material from advancing fire, the method being to construct a fire line or trail and enable fire fighters either to stop the fire directly or afford them a place from which to back-fire.

Water was never, until recent years, considered a practicable means of controlling forest fires, largely because it was scarce in regions of fire hazard. In the earliest days of the Forest Service, however, water was used, usually in "mopping-up" a fire. Thus originated the 5-gallon orchard spray pumps. They were heavy, however, and difficult to carry, and were but little used.

About five years ago the first back-pack pump outfit was adopted for fighting forest fires. Now a very essential part of fire-fighting equipment, the outfit consists of a 5-gallon galvanized-iron water can carried on the fire fighter's back. A hand force pump is connected to the can by a short length of hose, and various types of nozzles are used. The outfits are very efficient in extinguishing grass fires and subduing hot brush or reproduction fires so that men following the pump operator can work with axes, shovels, and other tools. After a fire has been stopped and a fire line constructed around it, these pumps extinguish burning material.

Starting from the second-line supply points, second-line coverage is worked out by the same methods. It is extremely unlikely that the crew coverage will be satisfactory upon first trial. If it is, the system satisfies the specifications for both first-line and second-line defense. If not, changes must be made to secure the required second-line coverage. The changes will usually be a substitution of roads for trails and an increase in length or speed of planned roads.

It is now necessary to coordinate the first and second line defense plans. Through balancing back and forth between first and second line overlays, the final system is determined. Unit costs are computed in the same manner as for the existing system.

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Portable Power Pumps

The use of back-pack pumps indicated the value of water judiciously used; the great need was to obtain more water. Many different types of portable power pumps have been developed, most of which can be carried by one or two men. Capacities vary, but pumps delivering 35 to 40 gallons per minute at 135 pounds pressure through 3/16-inch nozzle openings are very effective. One thousand to fifteen hundred feet of 1½-inch hose in 50-foot lengths are carried with each unit. A truck transports the unit as far as possible and it is carried by pack horse or man power to water near the fire. Although a large number of forest fires in California are beyond reach of water even with a pump and 1,000 feet of hose, such a portable pump is often needed, and each fire truck carries one.

The next step is the tank truck, practical use of which depends entirely upon road development. (Fig. 59.) During the last five years road construction within California's national forests has made many hazardous areas accessible to the motor truck, but on many such areas it is not yet feasible to use tank trucks. For this reason and because of lack of finances, the Forest Service has lagged behind the State and some county fire-fighting organizations in the use of tank trucks. These agencies protect areas of denser population at lower elevations, where road systems are much more complete.

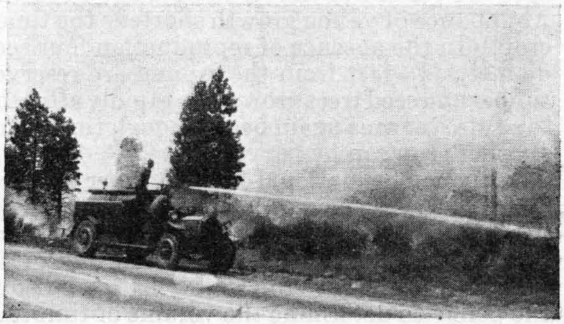

FIGURE 59.—Fire truck "washing out" fire along Pacific Highway. Shasta National Forest

The most efficient use of tank trucks demands numerous sources of water. On many hazardous areas water is scarce, and it must be collected in tanks or reservoirs from small streams and springs wherever practicable. Such storage development is expensive, but through the cooperation of another Government bureau the Forest Service has obtained 75 redwood tanks varying in capacity from 300 to 15,000 gallons.

Equipment of Tank Trucks

The tank trucks in use vary in capacity from 250 to 400 gallons, are equipped with either rotary or centrifugal pumps, and are usually driven by power take-offs on the transmission. They should at least be capable of delivering an effective stream of water through 1,000 feet of 1½-inch hose, with the point of delivery up to 200 feet above the truck. Suction hose is provided by means of which water can be drafted from streams. A thousand feet of 1½-inch hose is carried in 50-foot lengths and there may be additional amounts of ¾-inch or 1-inch hose on reels. Through Siamese connections several different streams of water can be directed from the same truck simultaneously. Shovels, axes, etc., and 10 to 12 water back-pack outfits ready for instant use, are auxiliary equipment.

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The immediate needs are speedy transportation through the construction of adequate road systems and consequent use of more powerful trucks, development of all needed sources of water supply, and the training of personnel in speedy and efficient use of water.

WALTER E. JOTTER, *Forest Service.*

FOREST Management of Cut-Over Land Aims at Uniform Yield Annually Ponderosa pine stands in Arizona and New Mexico contain trees of all ages from seedlings to old timber ripe for harvesting. In harvesting national-forest timber young, fast-growing trees and sufficient healthy well-formed larger trees are reserved to insure a new crop on the cut-over area. The number of trees reserved depends on the amount and condition of the original stand, and while the stand consists of various ages the volume of timber in each age class will vary on different areas. Abundance of young growth shortens the time for establishing the new crop. In the absence of reproduction four seed trees over 20 inches in diameter 4½ feet from the ground are reserved on each acre. Young timber and seed trees grow more rapidly after the area is cut over. When the cut-over area again bears enough timber to make cutting profitable another crop can be harvested.

In managing national-forest timber it is essential that the annual yields of timber be approximately equal. The virgin timber should be made to last until the new crop on the cut-over land is ready for cutting. Growing timber is a long-time undertaking and it is necessary to find out how rapidly the timber left on cut-over land is growing. It is the policy to determine the volume of timber left on the cut-over areas as soon as cutting is done, and later at intervals of from 10 to 20 years. The difference in volume indicates the total growth, and these data are used to determine how rapidly the old timber can be cut to insure a sustained timber business.

In 1907 a section of timber, near the edge of the timber type, on the Coconino National Forest, Ariz., was cut over. The site was dry and the original stand of timber light. There was cut from the section 2,208,000 board feet and a stand of 840,000 feet was reserved. In 1930, the volume of timber was found to be 1,390,120 board feet, a growth of 550,120 feet, or 23,918 feet per year. In view of the light stand reserved and the rather difficult site conditions, the growth is considered excellent. Better stands of timber on better sites show annual growths of 75 to 100 feet per acre of cut-over sale area. The reserved stand plus the growth will make profitable cutting in from 50 to 75 years, and shows the advantage of reserving young timber and seed trees when cutting timberland in the Southwest.

QUINCY RANDLES, *Forest Service.*

FOREST Resources Can Be Wisely Used Without Hampering Recreation Are those who use the national forests for recreation aware of the need for proper forest management which recreational use entails? A group of trees, a green mountainside, a good supply of game, all furnish refreshment and diversion. Consequently, people who love the outdoors, and who frequent the mountains and forests, want resources conserved. So

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ardent do they become sometimes that they insist on no cutting of timber, no grazing, and no hunting whatsoever.

But while seeking to preserve, they may easily set up conditions that will have an entirely opposite effect. What happens if man never cuts any trees? Often 30 or more seedlings start to a square foot, or over 100,000 to the acre. Competition for light, moisture, and soil nourishment is very severe and obviously many trees must die and be wasted before others can get room enough to reach large size. Eventually, old age, fungi, insects, or fire will destroy the remainder. This sort of protection has little in its favor. On the other hand, if man had harvested and used the surplus and mature trees before they rotted, the remaining trees would have grown faster. Harvesting need not mar the beauty of the landscape.

Denuded mountainsides, polluted water, and camp grounds frequently damaged by livestock have aroused the ire of nature lovers, but millions of acres in the West produce valuable forage that in many instances can be utilized without harm to recreational or aesthetic values. Livestock even contribute to these values. Bands of well-managed sheep grazing peacefully on the slopes add life to mountain scenery, and grazing cattle often draw attention to beautiful mountain meadows.

Even Game Must Be Thinned

Ruthless destruction of big game has brought about the closing of large areas to hunting. But even this sort of protection has its dangers. Game must eat. Their range can not be overstocked without damage. Regulated use of the surplus game is absolutely essential. Otherwise the herds will suffer from shortage of food, reduction in the rate of increase, and disease.

People seeking recreation in the forests get their diversion and refreshment by activities that stimulate both mind and body. Real physical recreation comes as the result of effort, and there is a real stimulus in the study of flowers, trees, rocks, and animals.

A scientific interest in making trees grow better and faster and an understanding of the difference between wise use and useless waste brings an added pleasure in forest recreation. With the increase in population and the growing concentration of people in cities, the desire and need for mountain playgrounds increase. The number of visitors to the national forests has jumped 1,000 per cent since 1917. More and more people are learning the value of outdoor recreation and feeling the need for it. But their recreational tastes can and should be developed to appreciate those arts which not only preserve, but produce more beauty, those arts which intelligently harvest forest crops that would otherwise be wasted.

DANA PARKINSON, *Forest Service.*

FOREST Restoration a Complicated Job on the Eastern National Forests Within many of the eastern and southern national forests, cutting and disastrous fires have taken all the virgin timber on large areas and left the land almost totally devoid of merchantable growth. In many cases, repeated fires have destroyed seed trees and reproduction, and seriously lowered the productive capacity of the soil. Forest weeds,

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such as pin cherry, hercules club, sassafras, and scrub oak, frequently cover such areas, and briars, annual weeds, grasses, ferns, and mosses are often abundant. Natural reforestation of the area by valuable timber species decreases because of the lack of seed trees and the unsuitable seed bed, while the undesirable cover increases.

Where such areas exist, careful planting surveys must be made to determine the amount of planting stock of suitable species and age classes that must be produced in the nursery for reforestation purposes. The chief forest nursery in the eastern region is located at Parsons, W. Va., on the Monongahela National Forest. It has an authorized capacity of 3,000,000 trees annually, largely red spruce transplants. (Fig. 60.)

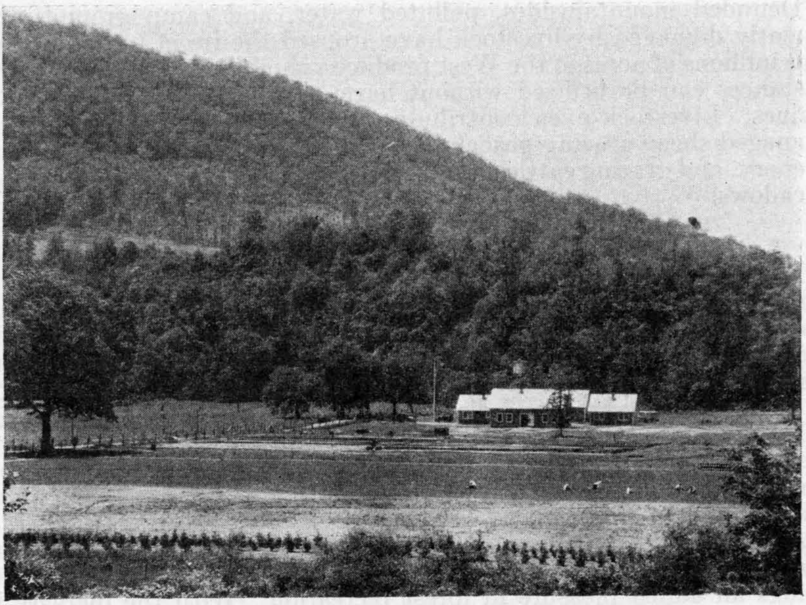

FIGURE 60.—The Parsons nursery, Monongahela National Forest, W. Va.

At Russellville, Ark., the Ozark nursery is operated on a basis of 1,000,000 shortleaf pine seedlings annually. Small experimental nurseries are located on the Ocala and Choctawhatchee National Forests in Florida.

Any reforestation program demands an adequate supply of seed. Many tree species grow over a wide geographic range, and it has been proven that seed from the southern portion of the range of a certain species is not suited to the production of planting stock for use in a decidedly more severe climate. It is essential, therefore, that seed be collected from thrifty trees in a location climatically similar to the area on which the young trees are to be planted.

The Handling of Planting Stock

Planting stock must be lifted just prior to the planting season, sorted, counted, bundled, packed, and shipped by train or truck to the planting site. Here it is heeled in until planted. Most of the planting

on eastern national forests is done in the early spring, although in the southern pine region, the planting season is from December to February. Planting camps are usually organized with sleeping quarters, mess tents, and tools. Planters are hired locally—farm or woods labor being preferred. Crews of from 10 to 14 men are used, each crew in charge of a trained foreman. On the more northern forests, such as the Monongahela and Allegheny, the square-hole method of planting is used. The hole is dug with a mattock or special planting hoe, the tree is set in the center of the hole, and the earth firmly tamped around it.

Conditions on the Monongahela, in West Virginia, are similar to those on the Allegheny National Forest in Pennsylvania. (Fig. 61.) The brush, if not too dense, provides some protection for the planted trees, and does not greatly hinder the work of planting. The ground cover, however, and especially the mass of roots in the top layer of soil, makes planting more difficult, and lessens the moisture available for the planted trees. Well-developed planting stock carefully planted is essential in securing good survival. Norway pine and Norway spruce have given the most promising results so far on the Allegheny, while red spruce is best suited to the Monongahela.

FIGURE 61.—Crew at work on a typical area in need of planting, Allegheny National Forest, Pa.

On the Ozark National Forest in Arkansas, the areas to be planted are old fields, most of which are no longer suited to cultivation. Shortleaf pine seedlings are planted on these areas in order to enable them to produce once more the crop for which they are best suited—timber.

In Florida, on the Choctawhatchee and Ocala National Forests, the problem is to plant longleaf pine on dry, sterile, sandy soils, devastated by repeated fires. The fire hazard is high, and scrubby oaks and other brush offer serious competition.

Experimentation to develop an effective technic prior to extensive reforestation is now under way on both the Choctawhatchee and Ocala.

With a tap-rooted species, such as longleaf or slash pine, the slit method of planting is satisfactory and economical. A vertical slit is made in the soil with a planting bar and the roots of the seedling are inserted in the slit, which is then closed by pressing the earth firmly against the roots with the planting bar and the heel.

Fire is the most serious enemy of planted forests. Plantations must be protected by firebreaks, roads, and trails, and during dangerous periods by lookouts and supplementary patrol.

Severe drought causes losses in plantations. Weak trees and those poorly planted are less able to survive extreme conditions than thrifty

trees carefully planted. Rabbits, porcupines, insects, and diseases may also become destructive to plantations.

On the Allegheny National Forest deer cause considerable injury by browsing the young trees. Areas which show evidence of intensive use by deer should not be planted.

White pine is not being planted extensively on eastern national forests because of the prevalence of the white pine weevil and the white-pine blister rust. This species is being used, however, to a limited extent on the Shenandoah, Natural Bridge, Unaka, and Pisgah National Forests. On the Shenandoah, wild currants and gooseberries (*Ribes* spp.), alternate hosts for the blister rust, occur and a definite program of eradication is under way. The disease, however, has not yet been found south of Pennsylvania. South of the Shenandoah there is little danger of infection of pine stands.

Artificial reforestation on the eastern national forests is by no means a simple task; it is complicated and arduous. Saw timber, pulpwood, and other forest products from acres now idle, and the regulation of stream flow will, however, justify the effort and cost.

L. S. Gross, *Forest Service.*

FORESTRY Is an Aid to the Farmer in Controlling Erosion Soil is the farmer's greatest asset, and the prosperity of any nation is dependent upon this basic element. American farmers have had so much good farm land that its abundance has often led to careless use or even to complete destruction of this most valuable resource. Erosion or soil washing

FIGURE 62.—This steep hill land should have been kept in woodland. After a few years of careless and unprofitable cultivation it has been abandoned. The old corn rows running up and down hill are rapidly becoming a maze of gullies

has probably ruined more good farm land than any other single factor. (Fig. 62.)

Threatened loss of his farm by financial disaster would stir the owner to action, but gradual loss by erosion seldom worries him until

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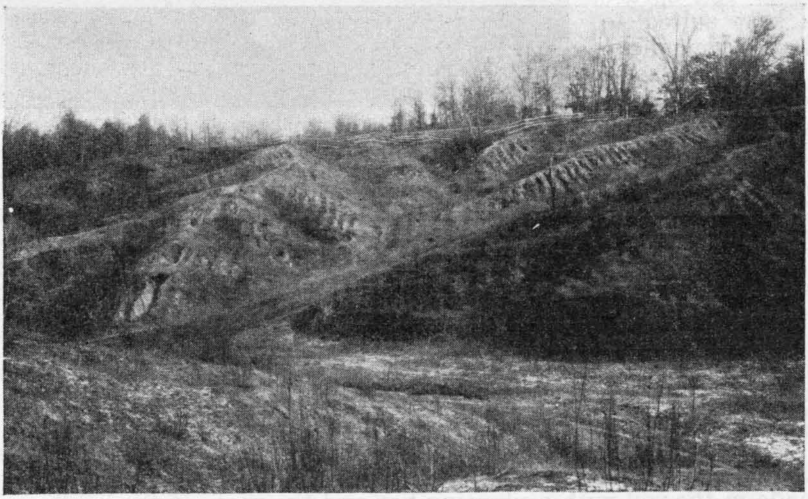

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Threatened loss of his farm by financial disaster would stir the owner to action, but gradual loss by erosion seldom worries him until

the damage has been done. Farm land is being lost gradually by erosion on cultivated hill lands throughout the country, especially where soils wash easily and rains are heavy.

The farmer is often not aware that sheet erosion or surface washing is taking the fertile topsoil until crops begin to show its effect, and then he usually believes that the crops have exhausted the land. If sheet erosion is unchecked gullies develop, and the farm may eventually become a hopeless waste and productive land may in a few years become a liability. Soil erosion is responsible for the loss of many farms through indebtedness. (Fig. 63.)

Preventive measures such as terracing, use of cover crops, and deep cultivation may be very effective in checking erosion on slopes up to 10 or 15 per cent. On steeper slopes and on areas subject to severe

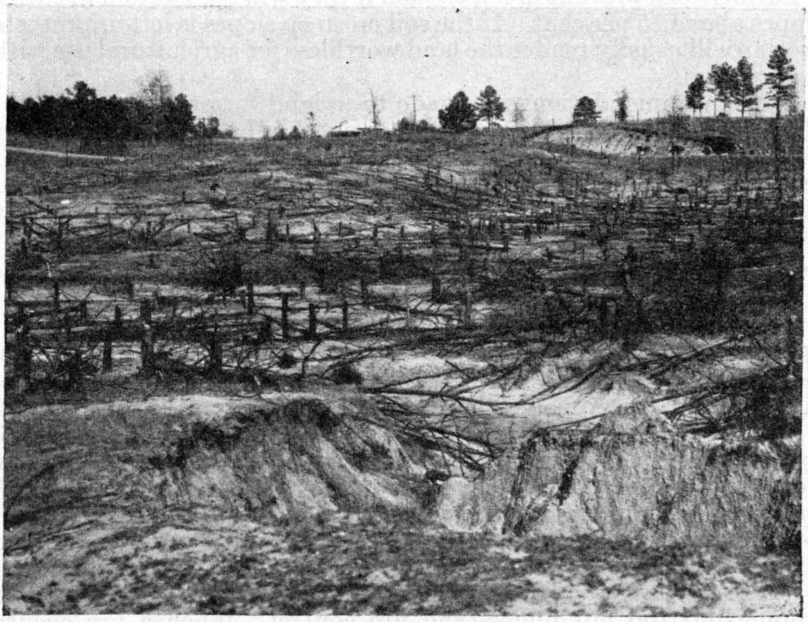

FIGURE 63.—With lack of foresight this farmer cut and burned young pine. He hoped this field would develop into a pasture but instead the area will soon be a gullied waste. The pines, if protected from fire, besides saving the land, would in a few years have produced a valuable crop of timber

washing, or on land already in gullies, a stable vegetative cover is necessary. A good grass sod or covering of vines may be sufficient, but trees are one of the most effective means of preventing or controlling soil movement. If properly managed and protected from fire and excessive grazing a forest cover will also yield the farmer an income in the form of timber, posts, and fuel wood. Foresters are giving increasing attention to the part forestry plays in solving the farmers' soil erosion problem.

Black Locust Widely Useful

Black locust is well adapted for controlling erosion over wide sections of the country. It grows rapidly and produces a vigorous, spreading root system that holds the soil in place. Furthermore, it is a legu-

minous plant which adds nitrogen to the soil. The wood is very hard and durable, and of particular value for fence posts.

For nearly 20 years farmers in parts of the central hardwood belt have been reclaiming gullied land by planting black locust. In many instances this formerly waste land valued at $1 or $2 an acre has in 15 years yielded 500 to 1,000 fence posts per acre. At 20 cents a post this represents a gross income of $100 to $200 per acre, returns which compare favorably with profits from cultivated and pasture land.

Other trees may prove as successful as black locust in stopping erosion although this has not yet been thoroughly demonstrated. Several experiments are now under way, particularly in the seriously eroded hills in northern Mississippi, by the Southern Forest Experiment Station.

Farmers can prevent much erosion if they will use caution in clearing slopes above 15 per cent. If the soil on steep slopes is left unprotected, erosion will usually render the land worthless for agricultural use within a few years.

Two recommendations are made to upland farmers, particularly to those located in the silt loam uplands and bluff soils region: (1) Keep steep slopes in woodland, thereby protecting the soil from erosion and assuring a continuous supply of timber, posts, and fuel; and (2) on land that is starting to erode, or already in gullies, plant trees which will keep the area productive.

J. D. Sinclair, *Forest Service.*

FORESTRY Is Reclaiming Cut-Over Charcoal Lands in Southern Appalachians

In the foothillls on both sides of the historically rich Shenandoah Valley, the ironmasters who operated the old iron furnaces unintentionally began an experiment in forest management over a century ago which now provides opportunities for the modern forester. (Fig. 64.) To produce the charcoal necessary in the smelting process, thousands of acres of timber were cut clean. Occasionally, the same area was cut over two or three times.

These "coalings" came up to fine stands of second growth, but the ironmasters did not understand fire control. When a fire occurred large crews went out to fire around the area being cut, which spread instead of checked the fire. "Turning the red bull into the woods" was the usual habit of small farmers who had a few cattle to graze. Bark peelers operating in areas adjoining the old coalings invariably set fire to the forest just before the peeling season as an insurance against burned bark. When not fatal to the trees, these fires resulted in scarred butts, retarded growth, and poorly formed trees.

As iron industries shifted to more profitable fields, the furnaces were closed down and the ironmasters sold their agricultural holdings, retaining only the more rugged, mountainous lands. In 1911 the Government started to acquire these lands, under authority of the Weeks law, and with their inclusion in the Shenandoah National Forest began the effort to repair the damage caused by repeated fires. In 1914, however, chestnut blight made its appearance, spreading south from Maryland. As chestnut comprised 20 to 60 per cent of the young stands, the importance of this disease is apparent. Control measures were soon found to be futile and steps were taken to salvage the chest-

minous plant which adds nitrogen to the soil. The wood is very hard and durable, and of particular value for fence posts.

For nearly 20 years farmers in parts of the central hardwood belt have been reclaiming gullied land by planting black locust. In many instances this formerly waste land valued at $1 or $2 an acre has in 15 years yielded 500 to 1,000 fence posts per acre. At 20 cents a post this represents a gross income of $100 to $200 per acre, returns which compare favorably with profits from cultivated and pasture land.

Other trees may prove as successful as black locust in stopping erosion although this has not yet been thoroughly demonstrated. Several experiments are now under way, particularly in the seriously eroded hills in northern Mississippi, by the Southern Forest Experiment Station.

Farmers can prevent much erosion if they will use caution in clearing slopes above 15 per cent. If the soil on steep slopes is left unprotected, erosion will usually render the land worthless for agricultural use within a few years.

Two recommendations are made to upland farmers, particularly to those located in the silt loam uplands and bluff soils region: (1) Keep steep slopes in woodland, thereby protecting the soil from erosion and assuring a continuous supply of timber, posts, and fuel; and (2) on land that is starting to erode, or already in gullies, plant trees which will keep the area productive.

J. D. Sinclair, *Forest Service.*

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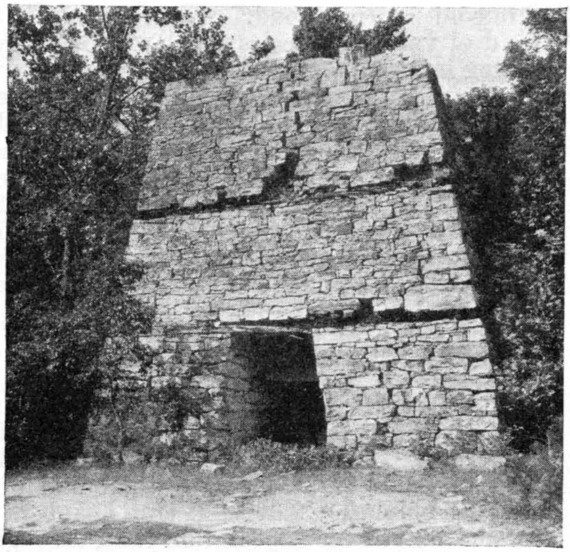

FIGURE 64.—Ruin of an old iron furnace on the Shenandoah National Forest

nut. Fortunately, a ready market existed in stave mills manufacturing barrels for Virginia apple growers. Thousands of cords of stave wood, chiefly chestnut, were cut from the coalings, along with other species of low value for saw timber or special products. (Fig. 65.)

Some Coalings Not Severely Burned

A few old coalings, however, escaped fire, or at least were not burned severely. The Mollies Hill area, which supplied wood to the old Crack-Whip furnace on Trout Run, came into Government ownership supporting a fully stocked 100-year-old stand of mixed hardwoods in which white and chestnut oak predominated. Density of the stand had retarded growth. It was first thinned and the chestnut removed for telephone poles. Then a sawtimber sale took out the less desirable oaks and the defective individuals of all species. Finally, the tops and unmerchantable trees

FIGURE 65.—Stave-wood and fuel-wood sales have removed fire scarred, defective, and weed trees from this young oak stand

were sold for fuel wood. The result is a thrifty, rapidly growing stand of valuable species which will be ready for another saw-timber cutting in 25 to 30 years.

In stands too small for saw timber, stave-wood sales remove the larger chestnut and inferior species, and fuel-wood cuttings take out everything else except the trees selected for the final stand. The object is to leave the proper number of trees of the best species to produce the maximum amount of most valuable wood products in the shortest time. Already hundreds of acres of these fire-scarred young stands have been placed in satisfactory condition for rapid growth through sale of defective and weed species at a net profit.

R. M. Evans, *Forest Service.*

FORESTRY 4-H Clubs Carry on Broad Program in the Central States Forestry is a relatively new project in boys and girls' 4-H club work. Forestry clubs are organized in more than half of the 13 Central States, with approximately 2,000 4-H club members enrolled. The project is carried on with the expectation that, through this phase of extension work, farm boys not only will come to have a better understanding of the forests and be led to recognize the existence of forestry problems, but that they will also learn how to conserve the present wooded areas and will become interested in providing forests for future use.

The practice and knowledge gained from satisfactorily completing this project do not, necessarily, make foresters of the boys, but do equip them with the ability to appreciate the forests, to know how to handle and protect the woodlands on their own farms, to participate in reforestation and forest-fire-prevention activities. and to assume their part in boys and girls' 4-H club work.

Supervised by Extension Agents

The 4-H forestry clubs are supervised by the extension service in the State concerned with the Office of Cooperative Extension Work, United States Department of Agriculture, cooperating. The organization of forestry clubs is under the direction of the State club leader and the county extension agent. The subject-matter material for this project is prepared under the supervision of the State extension forester. The local club leader directs the activities of the boys who enroll in any given local club.

Carry On a Variety of Activities

The 4-H forestry club boys engage in a wide variety of interesting activities. Among these are reforesting land areas on their own farms or on land obtained for this purpose, planting windbreaks or shelter belts about the farmstead, making improvement cuttings in the farm woodland, gathering tree seeds for their own use or for sale, and establishing private nurseries with the end in view of growing their own planting stock.

The great majority of 4-H forestry club members reforest a certain land area each year, looking toward the future ownership of a sizable piece of growing timber. In most of the States this accepted proce-

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dure is supplemented by group activities in which the entire club participates.

Forestry pageants are presented, exhibits are made at county and State fairs, demonstration teams are trained, hypsometers, calipers, and Biltmore sticks are made and used, fire lines are constructed when the size of the timbered area warrants, inspection trips are made to wood-utilization plants, and tree-identification hikes are taken. In certain States, the work of the older 4-H forestry club boys is recognized by the State authorities, who appoint them assistant State fire wardens.

Wisconsin leads in establishing school forests. The land, which usually is provided by some organization such as a lumbering company or a chamber of commerce, is deeded to the local school. Each year the club members reforest a definite area so that within a stated number of years the entire area will be covered with growing trees of different ages. Both Wisconsin and Michigan hold forestry-club camps where instruction is given by trained foresters, and where the boys enjoy the experience of camping out.

Iowa conducts a farm grove history contest which provides a means whereby farm youths become familiar with the history of the woodland on their own farms. In Minnesota a civic forest is now being developed by a forestry club which instituted the plan with the assistance of the village authorities. In the mining section of Minnesota the boys sometimes utilize the ore dumps for their planting. Ohio boys who live in the coal-mining section often do their planting on the mine strips when other land is not obtainable.

Such slogans as "Plan to plant another tree," "Have boys and trees grow up together," and "Youth develops where youth builds" are used in 4-H forestry club work.

R. A. Turner, *Extension Service.*

FRUIT and Nut Production Depends Greatly on Amount of Foliage the Trees Carry

The leaves of fruit and nut trees are essentially the factories in which the products that go to build the fruits or nuts are manufactured. Leaves are often spoken of as the lungs of the plant. While the leaves of plants do perform functions somewhat similar to those performed by lungs in animals, they do much more than this. They are really analogous to the digestive tract as well, for in the leaves the raw materials from the soil and from the air are built into the products that go into the fruit or nut and the woody tissues of the plant. These products, consisting of sugars, starches, acids, protein materials, and many other compounds, are either formed directly in the leaves or built in the fruit from the materials supplied by the leaves.

Thus it will be seen that the foliage of the plant is of tremendous importance from the standpoint of fruit and nut production. Within limits, the amount of fruit that a tree can carry through to maturity depends very largely upon the amount of foliage that it carries and whether or not conditions are right for the functioning of the foliage.

During recent years a great deal of work has been done to determine as accurately as possible the amount of foliage necessary to build certain fruits. With apples and pears, for example, it has been found that where only 10 well-developed leaves are present for each fruit

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During recent years a great deal of work has been done to determine as accurately as possible the amount of foliage necessary to build certain fruits. With apples and pears, for example, it has been found that where only 10 well-developed leaves are present for each fruit

on the tree, the fruit at the end of the season is smaller than the best commercial size, is generally poorly colored, and is likely to be poor in flavor. With 20 large leaves per fruit, apples and pears of fair commercial size are usually produced. With a crop of this size on the tree, however, the fruit uses for its development so nearly all of the materials formed in the leaves that most varieties are likely to produce a poor crop the year following. With 30 or 40 leaves per fruit present throughout the tree, fruit of better commercial size and better quality is obtained. Trees carrying this amount of foliage in proportion to the fruit crop are also in better condition to produce a crop the following year.

Factors Affecting Leaf Area

The amount of foliage that a tree carries is largely determined by the amount of growth that the tree makes. In the deciduous fruits the leaves are all produced on new growth, on either spurs or shoots, and the amount of leaf area is directly proportional to the amount of growth made. Thus a spur on an apple tree which grows 1 inch per year will carry a larger number and a larger size of leaves than a spur making only one-quarter of an inch of growth per year. Similarly, the longer shoots carry more leaves than the shorter shoots. Consequently, the best way to obtain increased foliage in the trees is to stimulate the growth conditions.

After the leaves are formed it is necessary to protect them from insect pests and diseases to prevent their being eaten away or their premature dropping. Any condition that results in defoliation of the trees before the fruit ripens will result in fruit of small size, poor color, and poor quality being produced during the year that the defoliation occurs. Defoliation is also likely to be followed by a crop failure during the following year. Any decrease in the number of leaves is likely to result in a corresponding decrease in the function of the tree.

Factors Affecting Leaf Function

Many factors influence the function of the leaves, but a few are of outstanding importance from the standpoint of the orchardist. Leaves function to build food supplies only when exposed to light. A reasonable amount of sunshine seems to be very desirable to obtain fruit of best size and quality.

Of tremendous importance, from the standpoint of leaf function, is the moisture supply available to the tree. Under conditions of severe drought the leaves apparently function to only a very limited extent in building food materials; consequently, under these conditions the fruit ceases to grow. In the case of nuts, if the drought comes early, before the shell has hardened, the nuts are likely to be small. Shells of nuts usually harden in midsummer, so that the size of the nut is largely determined by conditions existing during the first half of the growing season. If a drought occurs late in the season nuts are likely to be almost normal in size, but will be poorly filled, owing to the absence of leaf function during the period when filling occurs.

There is some evidence that leaves that are well supplied with nitrogen and other essential elements from the soil, so that they are of rich green color, function more effectively than leaves of similar area that are poorly supplied with nitrogen or other essential elements.

A shortage of nitrogen in the tree also results in decreased growth and leaf area.

There is also evidence that leaf function is at least partially correlated with the amount of crop on the tree. With a heavy crop the leaves present will function slightly more efficiently than with a light crop; consequently the greatest total weight of fruit per tree is usually obtained when there is a relatively large amount of fruit per unit of leaf area. However, the individual fruits under these conditions will be small and generally poorer in quality.

In order to obtain maximum production in fruits and nuts, therefore, it is necessary first of all that the growth conditions in the trees be such that a large leaf area per tree will be developed. This leaf area must then be protected from diseases and insects to enable it to function through the season. Moisture supply is of primary importance in maintaining leaf function. Maximum production apparently is dependent upon a large foliage area functioning at the maximum throughout the whole of the growing season.

J. R. MAGNESS, *Bureau of Plant Industry.*

FRUIT and Vegetable Depots Facilitate Distribution in Big City Markets The commercial production of fresh fruits and vegetables has increased tremendously during recent years. Modern means of refrigeration and transportation have made possible their distribution over long distances and to all markets. Specialized producing areas have been developed in many sections of the country, from which constant supplies of a great variety of products are available throughout the entire year. Total car-lot shipments of fruits and vegetables have increased about 50 per cent during the last decade, and now amount to around 1,050,000 cars annually. As a result of this greater use of fruits and vegetables in the American diet, and the growth of city populations, there has been an immense increase in the amounts of these products handled each day through the markets of metropolitan areas. These highly perishable commodities must be distributed to retailers within a very brief time if their quality and freshness are to be retained. Many of the wholesale produce districts have become so overcrowded and congested, however, as seriously to hamper rapid and effective distribution. (Fig. 66.)

To meet the needs for expansion and improved marketing facilities, transportation companies have in recent years constructed special depots in some of the large eastern markets for the exclusive handling of fruits and vegetables. These depots, or produce terminals, consist essentially of immense covered platforms, on which car-lot receipts are unloaded and sold. They have been built in connection with large railroad yards and team tracks, and usually are so located as to be readily accessible with a minimum of traffic congestion.

These terminals consist of one or more buildings, each with a floor space ranging in size from several hundred to 1,000 feet in length and approximately 75 to 125 feet in width. Railroad tracks extend along the sides, and the terminal floors are level with the doors of freight or refrigerator cars, so that unloading may be done with floor trucks. The railroad tracks are set in concrete paving and when the cars are

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moved out, wagons and trucks can be backed up against the platforms for loading. Sliding or folding doors all along the sides completely inclose the buildings during cold or stormy weather, and heat is provided during the winter. Some terminals are constructed with a full second floor the entire length of the building, furnishing office space for members of the local produce trade, while in others there is only sufficient upstairs space to provide auction rooms and offices for the railroad and terminal officials. Extensive cold-storage plants have also been built in conjunction with a few of these terminals.

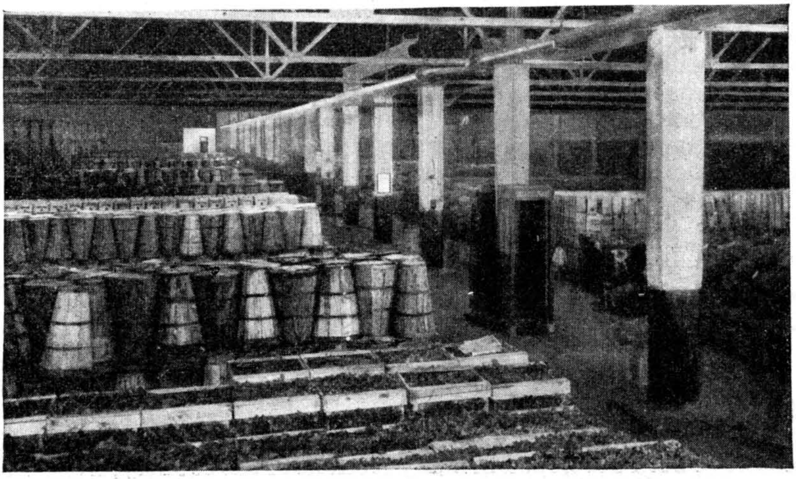

FIGURE 66.—Interior view of a typical produce depot, with fruits and vegetables displayed for sale. Sliding doors along each side may be raised or lowered as desired

Produce Sold on Terminal Floors

In the cities where such facilities have been provided, most of the fruits and vegetables received in car lots are unloaded and sold on these terminal floors, with the exception of watermelons, which are sold direct from the cars on adjoining team tracks. In some instances cars are not completely unloaded on the floor, but a small number of packages are displayed and sales are made from these samples. Daily offerings range from 40 or 50 cars to as high as several hundred, depending upon the season and the particular market. Unloading is done during the night by employees of the terminal or transportation company, who transfer the contents of each car to designated locations marked on the depot floor. The various containers in each load are sorted according to marks, sizes, etc., and stacked in piles or rows, with a number of packages opened for display.

Sales are made either privately or by auction. The products which are to be sold at auction are displayed on a separate part of the floor, for the inspection of the buyers. Auction catalogue sheets are printed, listing in detail the number of each brand, size, or grade contained in each lot, and the auction sales are conducted in another part of the building on the basis of these catalogue descriptions. Citrus and deciduous fruit auctions are held in the rooms overhead, but for a few commodities such as cantaloupes and tomatoes an auction is frequently held on the main floor, with a portable stand for the auctioneer. (Fig. 67.)

Private selling is limited to certain hours, usually in the early morning. As the time approaches for the opening of trading, everything is made ready for the day's business. Salesmen check their goods and complete their displays, and at the designated hour the buyers are admitted to the floor. The products are readily accessible for inspection, and quality, condition, size, and other factors of each lot may be readily determined. A great din arises, with hurrying feet, voices raised to shouts, and a great rattle of floor trucks as transactions are completed and purchases loaded into the waiting trucks and wagons for delivery. To the uninitiated, pandemonium seems to reign, but actually there is a high degree of order and system, and the day's business progresses at a rapid rate.

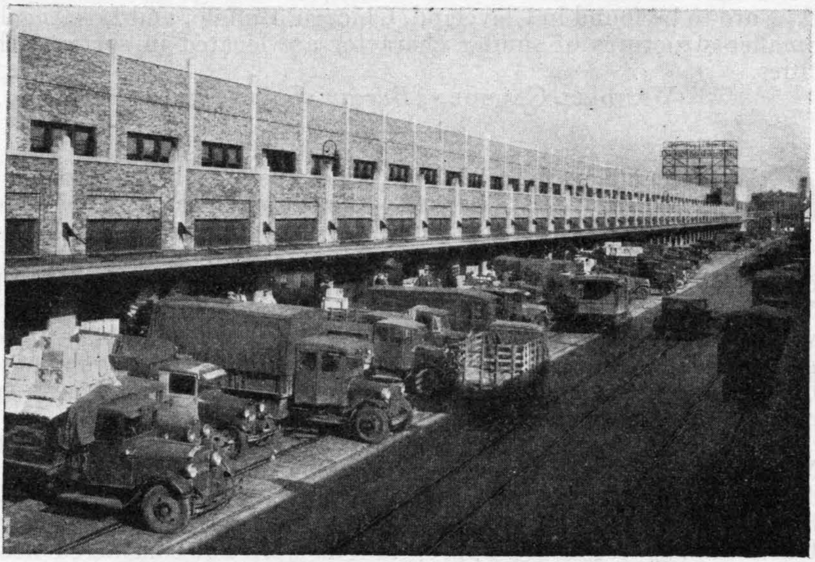

FIGURE 67.—Exterior view of a fruit and vegetable depot after the day's sales have been made. Note railroad tracks where cars are spotted during the night for unloading

Where there is more than one building or sales floor, fruits are usually displayed and sold on one, and vegetables on another. There may also be further subdivisions of the fruits, such as between cantaloupes, deciduous fruits and citrus fruits, and on the vegetable floor between the more highly perishables such as tomatoes and lettuce, and the semiperishable potatoes and onions. Successive hours of trading are often established for each group of commodities, to enable the buyers to devote their attention to each in turn. Semiperishable products may be held over on the floor from day to day, and some terminals permit unsold goods to be reloaded into refrigerator cars. In most cases, however, the more highly perishables are either sold on the day offered, or are removed to other storages.

Transportation Companies Provide the Facilities

The produce terminals so described are constructed by the transportation companies and serve essentially as depots for the unloading and delivery of fruits and vegetables, with the added privilege to the

receivers of conducting an organized market while the goods are temporarily held on the depot floor. Such terminals have been built in Philadelphia, Baltimore, Boston, Pittsburgh, and Detroit, and the same facilities are provided on the produce piers at New York City, although these have minor differences in construction and arrangement.

In some cities there has been a concentration of store facilities for wholesale produce dealers into continuous structures of uniform design, and many of these are also called produce terminals. There are, however, no general platforms or sales sheds provided for the unloading, display, and sale of goods received. In many cases these stores do not have adjoining rail trackage, and the commodities to be sold must either be hauled from the cars on near-by team tracks, or delivered to purchasers direct from the cars. Examples of large terminals of this type are to be found in Cleveland, Chicago, Buffalo, and Los Angeles. Smaller structures of similar character are located in several other cities.

WENDELL CALHOUN, *Bureau of Agricultural Economics.*

GIPSY and Brown-Tail Moth Infestations Are Checked by Imported Parasites

The gipsy moth was brought to the United States and accidentally established in Medford, Mass., in 1868 or 1869. The brown-tail moth, another foreign pest, was first found in Somerville, Mass., in 1897. The caterpillars of both moths eat the leaves of various forest, shade, and orchard trees and, when abundant, completely defoliate such trees. Each pest requires a year to complete its life cycle and during this time it passes through four stages—egg, caterpillar or larva, pupa, and adult or moth.

Between 1891 and 1900, when funds were made available by the Massachusetts General Court, satisfactory progress was made in reducing the numbers of the pests in the relatively small infested area, by using various hand methods to kill the eggs, larvæ, and pupæ. Unfortunately continued appropriations were not considered necessary from 1900 to 1905, and during this period the moths increased to such an extent, and spread over such a large territory, that hopes of exterminating them could hardly be entertained. In view of this situation it was realized that any method that offered possibilities in the way of control should be given a trial. Accordingly, in 1905 the Massachusetts General Court and the Congress of the United States appropriated money to be used in studying and importing into New England natural enemies that attack these pests in foreign countries. Except for the period between 1914 and 1922, this project has been continued, the Federal Government having had complete charge since 1911.

Importations Mostly From Europe

For the most part the importations have come from European countries, but northern Africa and Japan have also been visited by members of the Bureau of Entomology and some material has been received from these regions. Great precautions have been exercised at all times to avoid the introduction of insects which might prove harmful.

Of the beneficial insects that have been imported, 11 of the established species have demonstrated their usefulness by reasonable multiplication and control results.

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Between 1891 and 1900, when funds were made available by the Massachusetts General Court, satisfactory progress was made in reducing the numbers of the pests in the relatively small infested area, by using various hand methods to kill the eggs, larvæ, and pupæ. Unfortunately continued appropriations were not considered necessary from 1900 to 1905, and during this period the moths increased to such an extent, and spread over such a large territory, that hopes of exterminating them could hardly be entertained. In view of this situation it was realized that any method that offered possibilities in the way of control should be given a trial. Accordingly, in 1905 the Massachusetts General Court and the Congress of the United States appropriated money to be used in studying and importing into New England natural enemies that attack these pests in foreign countries. Except for the period between 1914 and 1922, this project has been continued, the Federal Government having had complete charge since 1911.

Importations Mostly From Europe

For the most part the importations have come from European countries, but northern Africa and Japan have also been visited by members of the Bureau of Entomology and some material has been received from these regions. Great precautions have been exercised at all times to avoid the introduction of insects which might prove harmful.

Of the beneficial insects that have been imported, 11 of the established species have demonstrated their usefulness by reasonable multiplication and control results.

A beetle, *Calosoma sycophanta* L., which in both its larval and adult stages feeds on gipsy-moth caterpillars, and in its larval stages on the pupæ of the moth, was first liberated in New England in 1906. It is known to be one of the most important enemies of the gipsy moth. Both the larvæ and adults are able to climb up the trunks and branches of rough-barked trees and thus to reach their prey.

Five parasitic wasps have been established. Two are minute forms that deposit their eggs within the gipsy-moth eggs, and these their larvæ destroy. One, *Anastatus disparis* Ruschka, was first released in 1908 and is more important than the other, *Ooencyrtus kuvanæ* Howard, which was liberated during the following year. Field collections of gipsy-moth egg clusters have been made in which over 40 per cent of the eggs were killed by Anastatus. Of three other parasitic wasps, one, *Apanteles melanoscelus* Ratz., was first colonized in 1911. Its larva is an internal parasite of the gipsy-moth caterpillar. The other two species, *A. lacteicolor* Vier. and *Meteorus versicolor* Wesm., kill brown-tail moth caterpillars in the same manner. While *A. melanoscelus* and *A. lacteicolor* are important parasites of gipsy and brown-tail moth caterpillars, respectively, their value is unfortunately lowered because they in turn are rather generally attacked by other parasitic insects. *M. versicolor* does not appear to be a parasite of prime importance.

Four important parasitic flies have also been established. Their larvæ feed within the caterpillars and kill them. *Compsilura concinnata* Meig. was first liberated in 1906 and, besides being of special value as an enemy of both the gipsy and brown-tail moths, is also known to parasitize the larvæ of about 125 leaf-eating insects native to North America, and to have spread well beyond the area where the moths occur. *Sturmia scutellata* R. D., first released in 1907, is a valuable aid in holding the gipsy moth in check. Its habits are interesting in that the female fly deposits her eggs on the leaves upon which the caterpillars feed, and it is in this way that they become parasitized—the eggs hatching after being swallowed by the caterpillars. The two other flies, *Sturmia nidicola* Towns. and *Carcelia laxifrons* Vill., are both parasites of the brown-tail moth, the former being of considerably more importance.

Host Insects Have Spread

Although the first colonies of these beneficial insects were placed in the field about 25 years ago, it has required a number of years for them to increase and disperse and to attain their natural relation to the fauna of the region. During the same time the host insects have spread from the comparatively limited area occupied in 1905 until they are now found in the greater part of New England. At first the brown-tail moth, because of the flight of the adult moths, spread more rapidly and even reached the Canadian Provinces toward the northeast, whereas the gipsy moth, from a small area near the coast, has moved inland in all directions. The insect enemies have followed, although less rapidly than their hosts, and are now generally distributed throughout the infested region.

Since 1911 annual examinations of the developmental stages of the gipsy moth have been made at a series of observation points scattered over the area infested at the time, in order to determine the intensity

of infestation and the degree of parasitism. Similar observations on the brown-tail moth have been conducted since 1920. The results of these studies have shown a rapid building up of the colonized insects, beginning in 1912, and, from time to time in different parts of the area, fluctuations in abundance which have accompanied the fluctuations of the hosts. Innumerable other, but less systematic, observations during the whole period since the gipsy and brown-tail moths came to this country have emphasized the continual fluctuations in abundance of these insects. Figure 68 represents graphically the tendency of the annual fluctuations in abundance of the two host insects and of their imported natural enemies, based upon systematic observations within the limited area mentioned above.

Figure 68 indicates that the gipsy-moth infestation, which had already reached a high level in 1912, remained so until 1921, when it began to decline rapidly and reached the lowest level in 1924, again in-

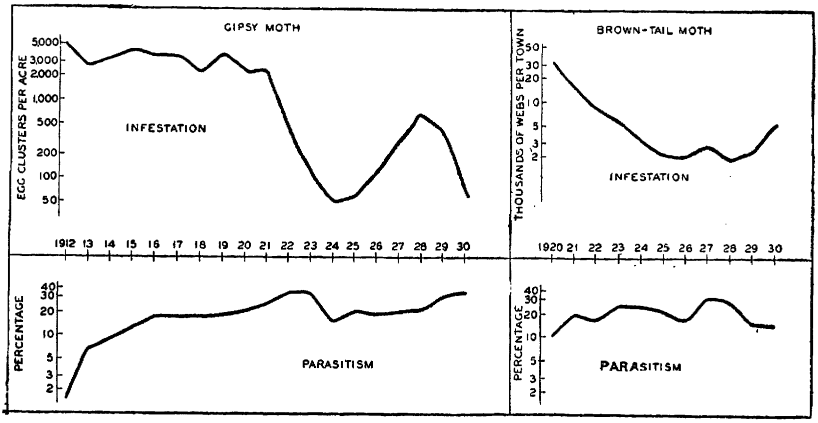

FIGURE 68.—Fluctuations in degree of infestation and degree of parasitism of gipsy and brown-tail moths in New England. "Egg clusters per acre" based on estimates made in special observation points. "Thousands of webs per town" refers to number of webs, in which caterpillars spend the winter, removed from trees and destroyed by State and town employees in towns considered

creasing in intensity until 1928 and falling off once more in the following two years. The corresponding curve of parasitism shows a general increase from 1912 to 1930, most rapid in the beginning, but maintained throughout the period except for the temporary falling off in 1924, when the infestation was at the lowest point. It is noticeable that the increase in parasitism continued (until 1923) beyond the point (1921) where the infestation began to decline.

Figure 68 also shows the general progress of infestation and parasitism of the brown-tail moth since 1920. Throughout this period the infestation has in general been at a very much lower level than it was between 1905 and 1920. It continued to decline until 1925, when it again began to increase. During this decade the fluctuations of parasitism have been more irregular than those of the gipsy moth. It is nevertheless seen that as the infestation was declining from 1920 to 1925 parasitism was in general increasing, and there is at least a suggestion in the curves that the two tendencies have approached a balance in the remainder of the period.

Intensity of Infestation

It is notable that since the establishment of the parasites the intensity of infestation of neither gipsy nor brown-tail moth has reached the high level attained in the earlier years, whereas the curve of parasitism has shown a general upward tendency.

Two of the imported parasites have been unexpectedly helpful beyond the immediate field for which they were intended. It has already been mentioned that *Compsilura concinnata* has become a valuable enemy of other destructive insects occurring in New England and neighboring areas. This fly has proved to be an efficient enemy of the satin moth, which is an introduced pest first found in New England in 1920. The same is true of a small parasitic wasp, *Eupteromalus nidulans* Thom., which was first imported from Europe as an enemy of the brown-tail moth, but which has never proved of appreciable value for its control in this country. These two introduced species are, as far as is known, the only important insect enemies of the satin moth in New England.

C. W. COLLINS *and* T. H. JONES, *Bureau of Entomology.*

GIPSY-MOTH Eradication Project in New Jersey Apparently Successful In July, 1920, the New Jersey Department of Agriculture reported the finding of a severe gipsy-moth infestation on a large estate near Somerville in that State. Investigation showed that this was by far the worst outbreak of this insect that had ever been found in the United States outside of New England. The female moths were depositing eggs on many of the tree trunks and the undersides of branches were so thickly covered with egg masses that the bark was almost completely obscured. Steps were immediately taken by the United States Department of Agriculture to determine the area infested and to apply treatment measures. The estate, which covered about 2,000 acres and was provided with 25 miles of roads and drives, was immediately closed to the public and the removal of trees and shrubbery was prohibited.

The worst part of the infestation centered in a 30-acre area of Koster spruce, several acres of which were completely defoliated. These trees had been imported from the Netherlands and other European countries in 1911, before the passage of the plant quarantine act regulating shipments of plants and plant products from abroad, and the insect was brought to this country in that way.

It was determined at the outset that the work should be directed by the Federal authorities and that the Federal Government and the State should finance the project jointly. A hurried survey made during July and August resulted in the discovery of many colonies of the insect over approximately 100 square miles of territory centering around Somerville, but a more detailed examination during the months that followed indicated that it had spread over more than 400 square miles. The seriousness of the problem was increased as a result of finding the insect well established in the Wachung ridges which extend in a series of wooded ranges across the northern part of the State, and because 318 shipments of trees from the infested estate had been forwarded to

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72 towns in the State, and 216 lots had been shipped to 17 other States. These shipments were traced and small infestations were found in Pennsylvania and New York as well as in nine scattered localities in New Jersey. Treatment measures were applied to all of these small isolated infested locations and the insect was exterminated during the following two years. (Fig. 69.)

In November, 1920, the State legislature appropriated $112,000 for conducting the work, $25,000 was contributed by the owner of the estate, and on March 3, 1921, Congress appropriated $225,000 for gipsy-moth work in New Jersey. Intense scouting and clean-up work was carried on during the fall and winter. It included cutting and burning large areas of badly infested trees and brush. Equipment was purchased and assembled so that upward of 20 high-power spraying machines were available for operation in the worst infested part of the territory early the following spring. Over 3,000,000 egg clusters were treated during the fall and winter and thousands of acres of tree growth were sprayed, more than 100 tons of arsenate of lead being used.

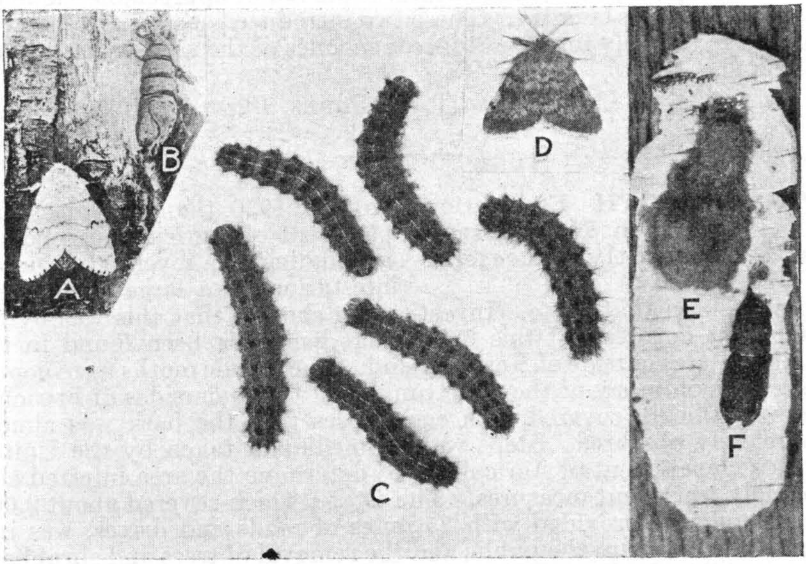

FIGURE 69.—Life stages of the gipsy moth: A, Female moth; B and F, pupæ; C, larvæ or caterpillars; D, male moth; E, egg mass. All about three-fourths natural size

The movement of nursery stock and other materials likely to carry infestation was regulated by a State quarantine which was enforced by the Federal organization acting under State authority. As a result of the first season's work no trees have since been defoliated by the gipsy moth in the State of New Jersey.

Eradication Task Undertaken

The problem of exterminating the insect, however, was more far-reaching and difficult than that of obtaining sufficient control to prevent obvious damage to vegetation. The habits of this insect were well known, the injury caused by it was a matter of record in the New England States, and the extreme difficulty of eradication after the pest

had become well established over a wide area was fully appreciated. Nevertheless the opportunity was offered to exterminate it over a large and difficult area. This opportunity was accepted by the Government and the State of New Jersey with the purpose of ridding the State of the pest and incidentally of eliminating the possibility of spread from this source throughout the adjoining States and to distant parts of the United States.

The plan of operation after the abundance of the insect had been materially decreased in the central part of the infested area was to rotate the work in different sections of the territory. An area was thoroughly scouted by experienced men, the egg clusters destroyed by an application of creosote, the center of the colony and surroundings sprayed with arsenate of lead in the spring after the normal time for hatching of the caterpillars, and the results checked up by expert men. The use of these methods for a single year does not give positive assurance that eradication has been secured when areas of country as large as a township are concerned and where the growth is varied and the terrain is irregular. After a lapse of intensive work in such an area for a season or two, it must be very carefully reexamined, sometimes more than once, in order to be sure that the result aimed at has been accomplished.

Various Methods Necessary

No set formula can be given for conducting an operation of this sort, as the methods used must be based on the conditions and on the nature of the tree growth in different sections of the territory. While wholesale cutting and burning of infested growth in some wild lands is the cheapest and most effective method that can be used, in residential sections or in areas where the tree growth is highly prized for shade or landscape effect, it is entirely impracticable, and more expensive methods such as treating egg clusters and spraying are necessary. The usual type of orchard sprayer is inadequate to meet the conditions of this work. Higher pressures are necessary to force the spray material through hose lines sometimes a mile in length. This is frequently required in heavily wooded areas. Special equipment such as hose that will withstand 1,000 pounds working pressure and specially designed couplings and nozzles must be used in order to effectively spray tall trees from the ground without climbing. Heavy truck sprayers can not be moved far from well-maintained roads and should be set up at the water supply in order to prevent the necessity of hauling water for the spray solution. (Fig. 70.)

Particular attention must be paid to the eradication of infestations along streams or watercourses in order that the egg clusters of the insect may not be spread to other localities on floating débris. In several instances it was necessary to mount spraying machines on small scows so that the trees along the edges of rivers might be sprayed when they could not be reached on account of swamps or flooded areas. This is only a single instance illustrating the ingenuity shown by the workers in the field in surmounting difficulties that arise in certain parts of the territory.

After the known infested area and the colonies in the outlying sections had been given careful attention, scouting was taken up in a belt of townships approximately 10 miles wide, beyond those where infestation had previously been found. This was necessary in order to make

sure that there were no outlying colonies, and increased the area in New Jersey requiring careful scouting to more than 2,300 square miles. Each year since this outer belt of townships was scouted the plan has been to gradually close in toward the center. In this way the territory has been gradually reduced and the expenditures decreased accordingly.

The largest expenditure made during the progress of this work was in 1923, when $295,000 of joint State and Federal funds were used.

Last Live Moth Found in 1929

The last live gipsy moth was found in New Jersey in June, 1929, but considerable work has been required in reinspecting territory in the central part of the area. This is a tedious and expensive operation. Not only is excellent eyesight necessary on the part of the men employed but a system of checking the work that has been covered is essential to prevent colonies of the insect from being overlooked. During the last three seasons traps baited with a material that will attract male gipsy moths have been used throughout the greater portion of the area that was once generally infested in order to secure additional evidence as to the presence of this pest, but no moths have been caught.

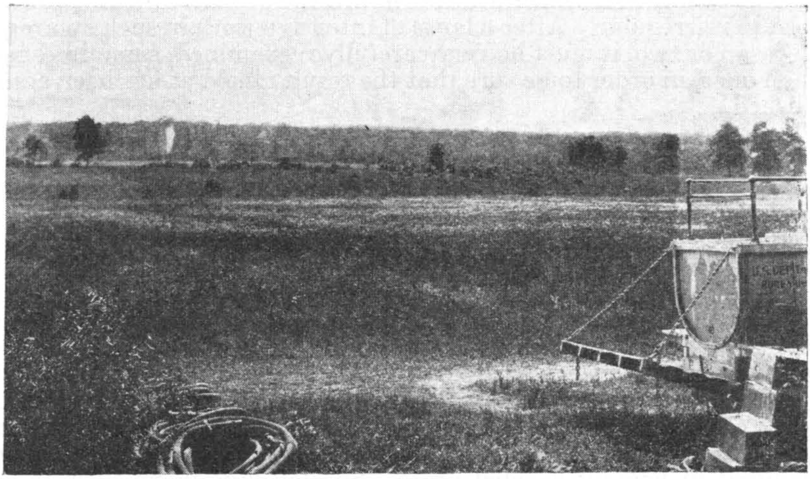

FIGURE 70.—Spraying woodland in New Jersey. The spray is being applied to trees in the background more than 2,000 feet from sprayer in the right foreground

Since the work began in New Jersey there has been expended on this project over $2,200,000. It is estimated that the cost of carrying through the reinspection work during the next year will be approximately $40,000, after which time, if no new infestations are found, a small amount of checking work should be done for a few years in the localities which are most likely to be infested, as a precautionary measure. (Fig. 71.)

The New Jersey gipsy-moth project covers the largest area where an attempt has been made to exterminate rather than to control this insect. Excellent cooperation has existed between the Federal and State organizations. This has been supplemented by sympathetic interest on the part of the citizens living in the infested territory. This attitude is particularly commendable when it is realized that in many cases the insect occurred in such small numbers that no visible damage could

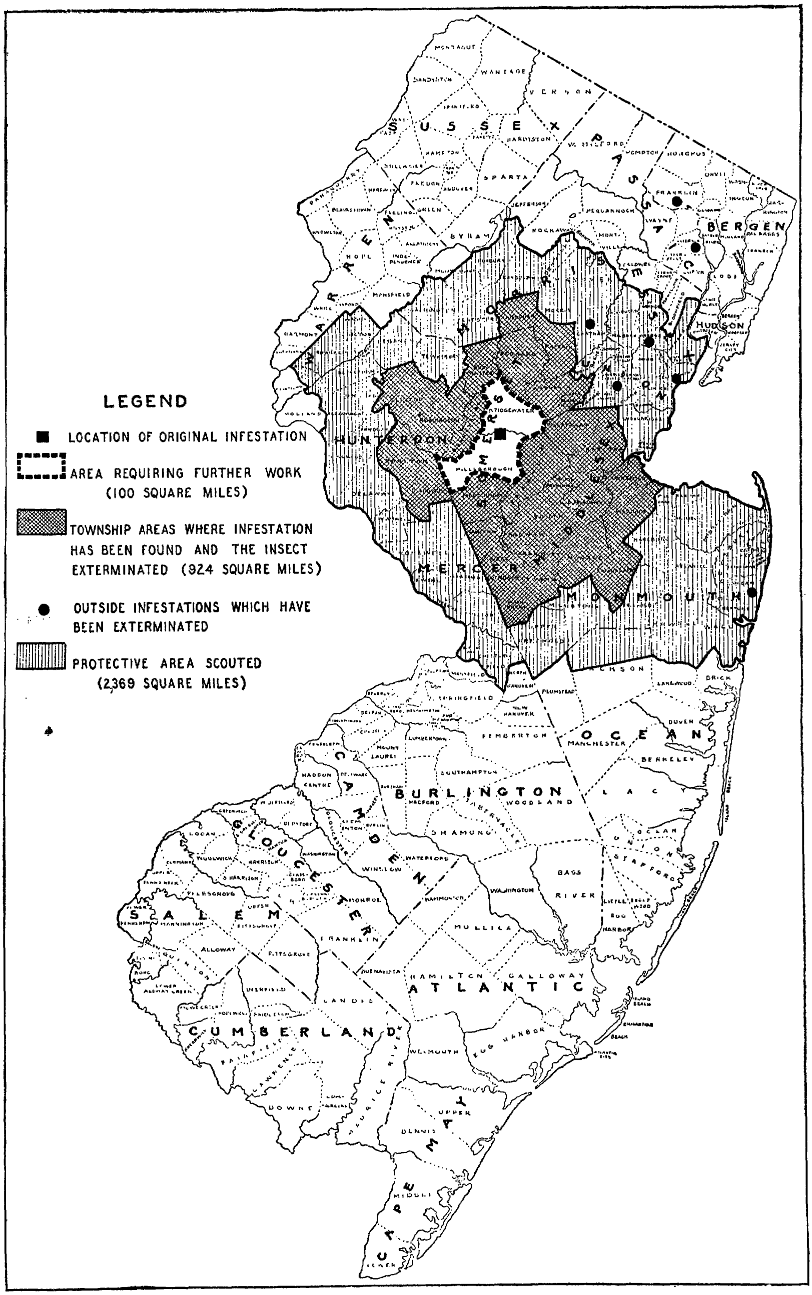

FIGURE 71.—Status of gipsy moth eradication project in New Jersey, April 15, 1931

be observed and that it was necessary to cause the owners serious inconvenience in order that exterminative measures might be applied to their property.

A. F. Burgess,
Plant Quarantine and Control Administration.

HOME Accounting Makes Good Headway Among Farm Women Rural home makers throughout the United States who have been keeping household accounts in cooperation with the Extension Service of the United States Department of Agriculture, report that household accounts tell them: (1) Where the money is going; (2) how much the farm is furnishing toward family living; (3) how to plan future expenditures that will bring more satisfaction to the family; (4) how to establish habits of thrift with the children; (5) how to divide the money wisely according to the many family needs; (6) how to adjust family disputes that arise in relation to money matters; (7) how to buy wisely and use the money intelligently; (8) the total amount of money spent for family living; (9) how to maintain desirable living standards through changing economic conditions.

In a number of States farm men and women have been meeting together for 2-day conferences to discuss the farm and home economic conditions of their counties and communities and to make recommendations as to better ways of farming and home making, based on their years of experience and on information which the extension agents are able to provide. During these discussions the men and women have analyzed the cost of living on the farm for the average family of five members. The analysis included the details of how much cash is required to provide the food supply; how much money is needed for clothing; the amount to be allowed for fuel, light, operating expenses of the home, and replacement of furnishings; what should be set aside for education, recreation, and community activities; and such items as personal needs and gifts. A comment made most frequently by the rural women taking part in these discussions was that they did not know how much money the family was using. In consequence, in every State the women have asked the extension agents to assist them in keeping household accounts.

The usual procedure has been to enroll in a study group the home makers who had become interested in household-account keeping. Many of these women were wives of farmers who were keeping farm accounts, and thus at the end of the year the totals for family living and farm expenditures could be analyzed and changes in management practices for both the farm and the home for the next year could be plotted. In other cases the interest of the wife in household accounts led her husband to start farm accounts.

The Extension Service sometimes furnished the household account book free or at a nominal cost. Often the women used a notebook and ruled columns, putting in the headings for the expenditures, or obtained the account book from banks or other commercial agencies.

Value of Accounting Recognized

At the first meeting of the study group the women discussed with the extension agent the method of entering the various items of expenditure, and simple ways and means of keeping accounts, such as a wall

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board on which the monthly sheet was thumb tacked, a pencil tied to a string, and a spindle to hold bills were fastened. At subsequent meetings the account keepers discussed the purchasing of clothing, the value of the garden products as a contribution toward the family living, the high cost of entertaining, the need of wise expenditure of funds for upkeep of the house and furnishings, how to obtain the cooperation of the family in keeping accounts, and how to teach boys and girls money management. At the end of the year the group met to make an analysis of their total expenditures. In some cases the Extension Service staff, or research workers of the land-grant colleges, gave assistance in making the analysis and helping to draw conclusions. The consensus of the women was that their accounts had been so valuable that they would not consider discontinuing them.

The comments made by household-account keepers, taken from the extension agents' reports, tell vividly the value they found in account keeping:

A mother and father who were looking forward to giving their children a college education said that they never would have been able to save the money if they had not kept accounts and worked out their budget in advance.

One home maker said, "You know, I thought I wasn't spending any money this year, and here my total money expenditure is higher than that of any other home maker in our group."

Many human interest stories tell of complete changes in the management of the home as a result of account keeping. An especially interesting story is that of a family in which the husband had had several operations and the family had become burdened with debt until they were almost hopeless. By keeping accounts they found that they were doing too much entertaining, and too much of the work, including food production, that could be done in the home, was being done outside. After keeping accounts for only a few months they were able to adjust matters so that they expected to clear their debt by the end of the year.

Influence on Health Habits

Account keeping often affects health habits, as is illustrated by this story. One woman stated that when her two little girls were born, while she was living in the city, it was necessary to purchase milk. In order to economize, the youngsters were denied an adequate supply, and in their teens these girls had trouble with their teeth. Later, the family moved to a farm, and two little boys were born. These youngsters had plenty of milk and have always had good teeth. The mother said that she realizes now that she might have saved much of the dental expense for the girls had she purchased milk for them while they were growing.

Another woman states that even though she is very busy and does not have money to spend on luxuries, she finds it worth while to keep a strict account so as to make the pennies go as far as possible. By keeping accounts she was able to improve her whole house.

Another woman comments that the greatest value she received from keeping accounts was that they enabled her to be sure that her income was being used to the best advantage. She also reported that the suggested budgets did not suit her needs. In order to reach her goal, of having her income sufficient to enable her to live as she had been

accustomed if the income stopped, she changed the percentage for savings given in the suggestive budgets to a much higher one.

It is difficult to estimate the value of keeping accounts from the point of view of changed attitudes and habits of living, but extension agents report that rural people feel that knowing how much money the farm is earning, and how that money is being spent, gives them a basis of comparison with the cost of living in the city, and makes many of them decide to remain on the farm. Accounts also furnish home makers with fact information that is not merely hearsay or a panacea. They prove that raising vegetables for home use is profitable in many instances, and that certain practices relating to buying materials for the home are economical. What is still more important is that keeping accounts and having family councils on money matters have made for happier family relationships.

Very few rural women have yet come to the place where they are willing to pay for the services of a trained person to assist them in household account keeping. The farm-management specialists report that farmers to-day are willing to pay as high as $25 a year for the assistance of a trained worker in farm account keeping. Perhaps the day will come when rural home makers will be willing to pay for a service of this kind, since it is fundamental in getting the most from the money earned by following the profession of farming.

MARY ROKAHR, *Extension Service.*

HOME-DEMONSTRATION Agents Assist in Developing Farm Family Resources Despite hard times and greatly reduced cash incomes, thousands of farm homes became better places in which to live during 1931. Early in the year many families realized that filled pantry shelves and storage bins, supplemented with all-year gardens, would be the best insurance against hunger and want during the winter. Consequently, extension agents emphasized the value of year-round gardens, fall gardens, the utilization of practical irrigation systems, hotbeds and coldframes, and the introduction of new kinds and varieties of vegetables, berries, and small fruits. Planting of improved home gardens was encouraged in many localities by establishing a demonstration garden, which showed what to plant, when to plant, how to cultivate, and how to take care of a continuous succession of growing crops.

In Arkansas, for example, home-demonstration agents visited 100,000 gardens in 1931. Of these 2,500 were demonstration gardens. Approximately 4,260 gardens on Arkansas plantations were supervised by Negro extension agents. Nearly 40,000,000 quarts of fruits and vegetables and other home-grown products were canned in 56 counties employing home-demonstration agents, and 45,592 farm families marketed $1,114,802 worth of surplus garden, poultry, and home-dairy products. In November and December, 1931, 6,399 beef-canning demonstrations were made by home agents in Arkansas. Nearly 42,500 families had fall gardens.

In promoting the live-at-home program, Texas farm and home demonstration agents helped to increase farm home gardens 45 per cent in 1931 over the previous year, to more than treble the amount of canning, and to extend the home production of meat to 75 per cent of the farms. About 50,000,000 cans and jars were filled with

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MARY ROKAHR, *Extension Service.*

HOME-DEMONSTRATION Agents Assist in Developing Farm Family Resources Despite hard times and greatly reduced cash incomes, thousands of farm homes became better places in which to live during 1931. Early in the year many families realized that filled pantry shelves and storage bins, supplemented with all-year gardens, would be the best insurance against hunger and want during the winter. Consequently, extension agents emphasized the value of year-round gardens, fall gardens, the utilization of practical irrigation systems, hotbeds and coldframes, and the introduction of new kinds and varieties of vegetables, berries, and small fruits. Planting of improved home gardens was encouraged in many localities by establishing a demonstration garden, which showed what to plant, when to plant, how to cultivate, and how to take care of a continuous succession of growing crops.

In Arkansas, for example, home-demonstration agents visited 100,000 gardens in 1931. Of these 2,500 were demonstration gardens. Approximately 4,260 gardens on Arkansas plantations were supervised by Negro extension agents. Nearly 40,000,000 quarts of fruits and vegetables and other home-grown products were canned in 56 counties employing home-demonstration agents, and 45,592 farm families marketed $1,114,802 worth of surplus garden, poultry, and home-dairy products. In November and December, 1931, 6,399 beef-canning demonstrations were made by home agents in Arkansas. Nearly 42,500 families had fall gardens.

In promoting the live-at-home program, Texas farm and home demonstration agents helped to increase farm home gardens 45 per cent in 1931 over the previous year, to more than treble the amount of canning, and to extend the home production of meat to 75 per cent of the farms. About 50,000,000 cans and jars were filled with

vegetables. More than 64,500 farm families provided a home supply of meat by canning. (Fig. 72.)

A food plan or budget for a farm family of five for one year, outlined by Texas home-demonstration agents, called for the production of $547 worth of food on the farm and the purchase of but $63 worth. The home production and conservation program called for a sufficient supply and variety of foods, including pork, beef, lamb, chicken, dairy products, vegetables, fruits, and cereals. The agents encouraged farm women and girls working under their direction to standardize surpluses and offer them for sale.

Farm home products were marketed more extensively during 1931 than ever before. While some of the money returns may appear small, the cash received in many cases covered one or more important family needs. It paid the mortgage interest; bought the schoolbooks and clothes; clothed the family for the year; paid the year's grocery bill; bought labor-saving equipment for kitchen, or laundry, or home dairy, or poultry work; painted the house; improved the living room; or kept a boy or girl in college. No other way of taking care of some of these items could have been provided.

In Garfield County, Okla., total sales in one farm women's market amounted to $14,225. In Arkansas 22 market-gardening demonstrations were conducted. Several roadside markets made a substantial contribution to the live-at-home campaign.

FIGURE 27.—A Texas farm woman with her home-preserved food supply. In 112 counties in Texas 256,217 farm families provided part or all of the year's food supply from canned vegetables, fruits, and other farm products

Thirty-nine home-demonstration markets in North Carolina sold $236,517 worth of products through club markets, carload shipments, and individuals. In South Carolina total sales as a result of home-demonstration marketing work amounted to $293,738. Eighteen club markets in Alabama reported sales of $347,652.

Farm women in Texas counties pooled their homemade rugs to fill an order placed by the manager of a large department store in Dallas for 100 hooked wool rugs. Their quality carefully protected by home-demonstration standards, a wide variety of products is sold privately in stores and in special markets by women and girls in Texas under the distinctive Better 4-H Products label.

The money with which to pay for needed household equipment or furnishings has often been supplied through the sales of farm home products from gardens and orchards, poultry flocks, and home dairies. The records also show that many other things have been sold, such as homemade rugs, canned goods, baskets, tooled-leather articles, quilts, gloves, and many other special homemade products.

Recognizing that convenience, comfort, and beauty in the home, well-kept grounds, appropriate clothing, and wholesome recreation are essential, agents encouraged farm families to strive to attain these ends in practical and economical ways. More farm women in Texas enrolled as demonstrators to improve their living rooms in 1931 than in 1930 and greater interest was shown by the club girls in improving their bedrooms. Some of the women have exchanged quilts for rugs, canned goods for furniture, and so on. Often keen family interest in home improvement has led to the exchange of field labor for labor in painting the house, in paper hanging, or in installing plumbing.

Much resourcefulness and ability are shown in the use of shrubbery in beautifying home grounds. Satisfying improvements have been accomplished by work involving little or no cash outlay.

There has been more organized group activity in community improvement, road and highway beautification, and wholesome recreation.

OLA POWELL MALCOLM, *Extension Service.*

HOME-DEMONSTRATION Work Influences Farm Women, Survey Shows Approximately 1,200 counties in the United States now have county home-demonstration agents who work with the farm women on problems closely associated with the home. In a large proportion of the remaining counties considerable work with farm women is done by the county agricultural agents with the assistance of the home-economics specialists from the State colleges.

During 1930 extension agents reached 646,000 women through formal groups organized for study purposes. In addition, many women were reached individually by extension workers, and much information was passed on to neighbors by local leaders and others affiliated with the various home-demonstration clubs or home-bureau groups, as they are variously called in the different sections of the country.

In order to obtain reliable information on whether extension teaching actually is causing farm women to take up improved methods of home making, personal interviews with all the farm women in representative areas of 16 States have been held. In 12 of the States home-demonstration agents have been employed in the counties involved in the studies for an average of six years. In two of the States the counties studied had had the services of a district home-demonstration agent serving from three to four counties, while in the remaining States the only home-economics extension conducted outside of emergency work, during the war period, was handled by the agricultural agents, with the assistance of State home-economics specialists.

According to the information supplied by the women themselves, new or better practices have been accepted as part of the regular home procedure in 32 per cent of all the farm homes in the areas studied. The percentages of homes reporting changes due to extension teaching ranged from 7 per cent to 65 per cent. The number of changed practices reported varied from 12 to 177 per 100 homes. The changes most frequently reported related to clothing and to food preservation. Other changes reported with great frequency dealt with food preparation and the nutritional technic of feeding the family.

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As these four lines of work are equally applicable to homes of owners and tenants, it was not surprising to find that approximately the same percentages of each have been influenced by extension.

Size of the Farm a Factor

The size of the farm apparently has some bearing upon the adoption of better home practices, the percentages of homes influenced being a little higher on the larger farms.

The distance from the county extension office, and whether the home was situated on an improved or an unimproved road, had little if any bearing upon the adoption of home-economics practices.

In six areas where information on educational training of farm women was obtained it was found that a definite relationship existed between the amount of formal schooling received and the extent to which home-economics practices were changed.

On the other hand, age of farm women seemed to have little bearing upon the adoption of new or better practices, the older women reporting practices changed about as frequently as the younger women.

By far the most important factor affecting the adoption of practices was contact with extension workers. Where farm women had attended home-demonstration meetings or had otherwise come into personal contact with the home-demonstration agent or State specialist, six times as high a percentage reported practices adopted as was true among women making no such contact. More than twelve times as many changes per 100 homes were also reported for the contact group as for the noncontact group.

In order to get the most out of extension work farm women should belong to the local home-demonstration club, attend extension meetings, and in other ways inform the extension workers of their interest and individual problems.

Home-demonstration workers must assume the responsibility of stimulating interest and influencing the women outside of home-demonstration clubs, by means of bulletins, circular letters, personal visits, news stories, and similar means and agencies.

M. C. Wilson, *Extension Service.*

HONEY Grading Stamps Give Consumer Full Confidence in Product In the United States there are found honeys of many distinct flavors, each flavor determined by the variety of flower from which the bees gathered the nectar. In certain regions where farms are large it is not uncommon to find hundreds of acres of a single variety of nectar-producing forage plant. The white-clover belt in the central northern part of the United States produces white-clover honey in large quantities. In the Intermountain States, Nebraska, and the Dakotas, alfalfa and sweetclover furnish enormous crops of honey. The honey in the Pacific Coast States comes largely from alfalfa, orange, sage, star thistle, and fireweed, whereas in the South tupelo, sourwood, gallberry, and cotton are the principal sources. Buckwheat honey in commercial quantities is furnished chiefly by New York and Pennsylvania.

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It is only natural to expect a variation in color, flavor, and physical appearance of honeys coming from such a wide geographical range. Honeys vary in color from water white to very dark amber. There is some correlation between the color and the flavor of honey, the dark honeys usually having a more pronounced flavor than those of lighter color. Tupelo and sage honeys remain in clear liquid form almost indefinitely, whereas honeys from alfalfa and sweetclover crystallize shortly after their removal from the hive.

Honey is available in two forms—extracted and comb. Extracted honey is produced by the bees in the same manner as is comb honey except that it is made in larger combs; the liquid honey is afterwards separated from the comb by means of a centrifuge or extractor. Extracted honey, in its liquid or in its granulated form, is sold in tin cans, pails, or glass jars. Comb honey, on the other hand, is sold in the small square sections just as it was sealed by the bees. (Fig. 73.)

FIGURE 73.—It's all good honey

Product Merits Consumer's Confidence

As relatively few persons ever have an opportunity to familiarize themselves with beekeeping, the great majority have no conception of the manner in which honey is produced commercially. They therefore look upon all honey with suspicion, whereas, so far as genuineness and purity are concerned, there is probably no food product on the market in which the consumer may place greater confidence. In the first place, adulteration of honey is not a profitable undertaking and, therefore, has never presented a problem to State and Federal pure-food officials. Although the pure-food law prohibiting the shipment from one State to another of impure or adulterated honey as pure honey has been rigidly enforced, less than a dozen instances of misbranded or adulterated honeys have been found by Federal inspectors since the passage of the law in 1906. In the second place, the only difference between the commercial

honey of to-day and the bee-tree honey of yesterday, in which some persons still have such faith, is in the matter of cleanliness. Beekeepers have gone a long way toward perfecting clean methods of handling honey, but they have not changed the product of the bee.

Recently the Department of Agriculture, by recommending and putting into official use the United States grades for honey, has taken still another step to insure the consumer access not only to genuine honey, but to the best honey. These grades cover every form of honey produced and the fundamental principle underlying them all is that the honey must be of good edible quality. For example, between the two grades of extracted honey designated as Fancy and No. 1, practically the only difference is that the latter may have air bubbles and small particles of wax which are not permitted in the former. In the grades of comb honey the difference is largely a matter of color and evenness of cappings and the completeness with which the bees have filled all the cells of a section, although in all grades sections are sold by weight. (Fig. 74.)

The employment of the United States grades by producers of honey carries with it the privilege of using Government grading stamps, which offer a medium for describing the many commercial honeys

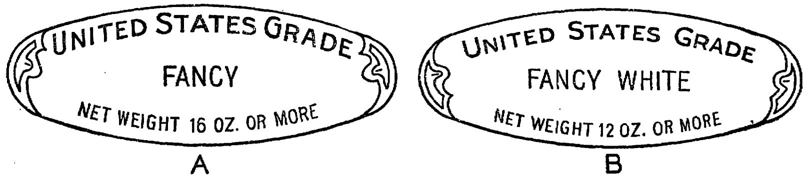

FIGURE 74.—Grading stamps: A, Extracted honey, B, comb honey

produced in this country. As the consumer learns what these grading stamps signify, he discovers that it is possible to obtain exactly the color and quality of honey which he desires. By bringing about a better understanding on the part of the consumer, the United States grades for honey not only facilitate sales, but they also give the consumer greater confidence in this most wholesome of sweets.

GEORGE E. MARVIN, *Bureau of Entomology.*

INBREEDING Experiments with Guinea Pigs Are a Guide in Stock Breeding "Never practice close inbreeding if you want vigorous and prolific livestock," is advice often heard among farmers. There is also a common belief that the stock will run out and that they will lose size and be more subject to disease. These results have been experienced by many farmers who have inbred their stock extensively.

In the endeavor to obtain more definite information on the effects of inbreeding than general observation has furnished, the Bureau of Animal Industry planned an experiment that has been conducted continuously for the last 25 years. The purpose was to determine the effects of close inbreeding when carried on for successive generations. Guinea pigs were selected as the experimental animals because an extensive experiment of this nature with the various classes of livestock would be too expensive and would require too much time. In

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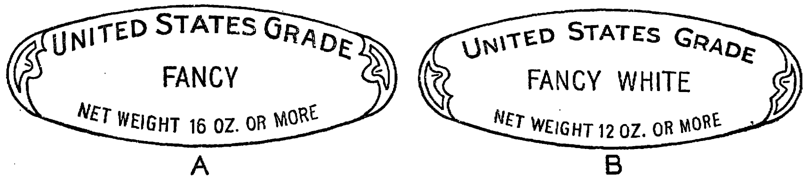

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general the results obtained with guinea pigs should be similar to those likely to be obtained with larger animals.

The experiment has now extended through 30 generations of the closest possible inbreeding—that of matings between brother and sister. Data on about 25,000 animals have been recorded during the quarter century. To accomplish this same amount of work with cattle would require about 120 years, with sheep about 70 years, and with hogs 40 to 50 years.

The experiment was begun with 35 lines of guinea pigs, but 11 failed to produce a second generation and 1 line was disposed of because of a skin disease, thus leaving 23 lines in the experiment. Between 1906 and 1911 some of these 23 lines became extinct, because of weakness, and between 1911 and 1917 three or four other lines were disposed of because they could not be maintained by brother-sister matings. Only five lines continued through the 25 years. For comparison with the closely inbred lines, a control stock was established in 1911 and maintained by matings not more closely related than third cousins.

Practical Examples in Hog Raising

At the beginning of the experiment the five lines differed in number of young per litter, birth weight and weaning weight of the young, percentage of young born alive, and percentage of those born alive which were raised to weaning. All these factors mean profit or loss to livestock producers.

Let us consider, for example, the results of the guinea-pig experiment in terms of swine. In the number of young per litter, there was a decrease of nearly 27 per cent in all the inbred lines of guinea pigs for the 25-year period. At the same decrease in swine, if sows at first produced 12 pigs to the litter, at the end of about 30 generations of inbreeding they would produce only 8 or 9 pigs to the litter. But this is assuming all are born alive. After 30 generations of inbreeding it was found that there was a decrease of over 20 per cent in the number born alive. Accordingly, the number of live pigs would be only 6 or 7, and of these, only 4 or 5 would reach maturity and be marketable. Certainly there would be no profit in this. It is true that all the five lines of guinea pigs did not have so great a decrease in litter size or so great a mortality. Some breeds of hogs might suffer more or others less from the practice of close inbreeding, but, in general, it would not be a safe procedure for the average farmer to follow.

Swine breeders usually aim to produce spring and fall litters. Guinea pigs normally breed every 69 days, a frequency which makes possible 5 litters during the year. Inbreeding reduced fertility to such an extent that instead of 5 litters, only 3 litters a year were produced on the average by the inbred stock. In hog production this loss would not be so great as with guinea pigs, but it might delay breeding to such an extent that in some years production of 2 litters would not be possible.

For the last 15 years of the experiment, records were kept of matings which proved to be completely sterile. During this time nearly 10 per cent of the matings never produced a litter. It is true that the fertility of the stock at the beginning of the experiment was not known, but 10 per cent sterility seems large and with any class of livestock would be a serious loss.

Signs of Progressive Weakness in Inbred Stock

Mortality losses in these studies included young dying just before or at birth and those dying between birth and weaning. The first group is known among stockmen as stillbirths. This type of mortality is probably an indication of weakened constitution or some physiological disorder in the dam, a condition which interferes with the birth of living young. In the guinea-pig experiment the number of stillbirths increased as inbreeding progressed. The number of young dying between birth and weaning also increased as inbreeding progressed, a fact which probably indicates weakness in the young as well as in the dam.

The mortality of the mature guinea pigs was also taken into consideration. The death rate of females was much greater than that of males during the reproductive period of the females, but there was considerable difference in female mortality among the five inbred lines. Two lines had a very heavy death rate at the birth of the first or second litter. In two other lines the female produced three or four litters and then died. In the fifth inbred line the females had a greater length of life than those in the noninbred stock. If there are such differences in breeds of livestock, it would certainly be advisable for the farmer to select strains of known long life for his breeding stock.

Weight apparently was influenced less by inbreeding than by the factors just discussed. In most of the lines there was a lower birth weight and weaning weight than in the foundation stock and early generations, but some lines showed a gain. In every case the percentage of change in birth weight during the 25-year period was much less than the percentage of changes in fertility and mortality. Gains between birth and weaning, however, dropped about 33 per cent. In every case the weaning weights at the end of the 25-year period were less than those at the beginning of the period and averaged nearly 25 per cent less. Let us consider these results also in terms of swine. Even though inbred pigs at birth might weigh the same as those not inbred, the gain up to a certain age would be 130 pounds instead of 200 pounds. Thus the farmer would have to feed his pigs for a longer period in the effort to bring them to a desired market weight. The same would hold true for beef steers and market lambs.

Control Stock Also Declines, Though More Slowly

All the foregoing facts make a bad case for inbreeding, but comparisons with the noninbred stock indicates that other factors may have been responsible for some of the decline experienced. In 1911, when observations on the noninbred stock were begun, there was very little apparent difference between it and the inbred lines. The noninbred stock, however, has shown declines similar to those of the inbred stock in nearly every respect except that they have been at a less rapid rate. Apparently the control stock is more nearly maintaining its vigor. Change in size of litter has been about equal in both inbred and noninbred stocks. The increase in mortality among the inbreds has been about twice as fast as in the noninbreds. In weight at birth and weaning, the noninbred line made a gain during the 25-year period, but the gain at weaning was much lower than the gain in birth weight because of lower percentage gains.

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Many Interesting Variations Observed

This condition complicates matters and makes one wonder whether the damage attributed to inbreeding really was due to such inbreeding itself or to other causes. As a matter of fact, inbreeding and certain other causes, which we may call environmental, are probably operating together to give the results obtained. Some of the evidence to show that inbreeding does play a large part in the decline of the guinea-pig stock lies in the fact that the noninbred lines did not decline at so rapid a rate as the inbred. Another may be in the fact that there is only one-third as much sterility in the noninbred stock as in the inbred lines.

Still further proof may be in the difference among the various inbred lines in their response to inbreeding. The five inbred lines differed from one another under the same conditions of feed and management. If these conditions alone were responsible for the decline in the various factors mentioned, one could reasonably expect a similar percentage decline in all lines, and that all would maintain their same relative ranking in fertility, mortality, and weight. This is not the case, however. The line which produced the smallest litters in 1906 produced the largest in 1930, and the one which produced the largest in 1906 had fallen to second place in 1930. The greatest decrease in litter size was almost 37 per cent, whereas the smallest was only 3 per cent. The line with the highest mortality at birth at the beginning of the experiment has become next to the lowest in this respect but has suffered the greatest loss in birth weight and weaning weight of its young. The three lines with the lowest mortality at birth in 1906 had the highest mortality in 1930.

These and many other similar results bring out the point that inbreeding has intensified and fixed certain hereditary differences in size and frequency of litter, rate of gain, mature weight, and mortality. The hereditary basis for such differences is very complex and only by intensive inbreeding is it possible to establish true breeding strains. There is added difficulty, however, in combining all the desirable characteristics in one line. For instance, the line with the greatest fertility and longest life has the disadvantage of low weight. Also the line producing the heaviest young has the disadvantage of high death rate. Thus, frequently when several characters are concerned the good points are counterbalanced by undesirable ones. These undesirable characters are intensified by inbreeding just as are the good ones. Thus it is distinctly advisable for the breeder to use only superior individuals if he breeds closely. Inbreeding may be a valuable instrument for remedying defects, but as in surgery it should be guided by an experienced and expert hand.

O. N. Eaton, *Bureau of Animal Industry.*

JAPANESE Beetle Has Found Conditions in Eastern States Ideal

Fifteen years have now elapsed since the Japanese beetle was first discovered in the United States. Observation and experience have shown unmistakably that the beetle has found conditions, in the eastern portion of the country at least, ideally suited for its rapid multiplication; favored host plants in abundance; and an almost total lack of parasites, native to this new environment, able to hinder its development to any marked extent.

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Distribution in the United States

The influence of modern agencies of transportation and commodity distribution upon the dispersion of an insect is well illustrated by the dispersal of the Japanese beetle. All available data support the belief that the beetle, although a vigorous flyer, is exceedingly erratic in its flight and its average rate of natural dispersion is not normally in excess of about 5 miles a year. However, a much more rapid distribution is inevitable and has actually occurred as a result of present-day transportation methods. The approximate distances from the original point of infestation (Riverton, N. J.) to the most distant points where beetles were found during the summer of 1931 are, to the north (Little Falls, N. Y.), about 220 miles; to the east (Boston, Mass.), about 270 miles; to the south (Charleston, S. C.), about 575 miles; and to the west (Columbus, Ohio), about 430 miles. That the distribution has not been much more widespread may properly be credited to the enforcement of Federal and State quarantine restrictions on the movement of various carriers and products.

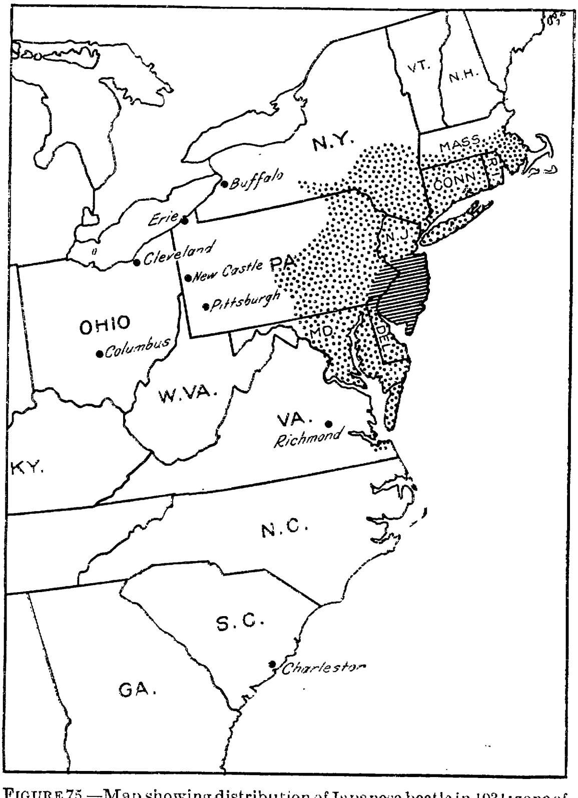

FIGURE 75.—Map showing distribution of Japanese beetle in 1931; zone of continuous infestation shown by cross lines, zone of discontinuous infestation shown by dotted area, separated points shown separately

The area of distribution at the close of the 1931 beetle season may be roughly divided as follows (fig. 75): A zone of continuous infestation, which comprises the southern three-fourths of New Jersey, with the exception of the lower one-half of Cape May County; the southeastern counties of Pennsylvania, adjoining the city of Philadelphia, as far west as Quakertown, Pottstown, Coatesville, and Kennett Square; and the extreme northeastern corner of Delaware as far south as the vicinity of Delaware City. Beyond this area, a zone of discontinuous or localized infestation, the outer limits of which are indicated by such localities as Boston and Springfield, Mass.; Albany, Little Falls, Binghamton, Elmira, and Watkins Glen, N. Y.; Sayre, Williamsport, Lock Haven, Altoona, and Chambersburg, Pa.; Hagerstown and Brunswick, Md.; Washington, D. C.; and Alexandria and Norfolk, Va. Still far-

ther out, a number of widely separated points of limited infestation, such as Buffalo, N. Y.; Erie, New Castle, and Pittsburgh, Pa.; Cleveland and Columbus, Ohio; Richmond, Va.; and Charleston, S. C.

FIGURE 76.—Lighter patches indicate turf killed by Japanese-beetle grubs

Population Density

An outstanding factor in the situation has been the amazing reproductive capacity of the insect under favorable environmental conditions. When the Japanese beetle was first discovered in August, 1916, only a very few beetles could be found; three years later, in the same immediate vicinity, from 15,000 to 20,000 could be collected by hand by one person in a day; in 1929, on a 15-acre lawn not many miles distant, approximately 10,000,000 beetles were caught in traps in 44 days. At favored points of heavy infestation, such as in well-kept lawns or golf greens (fig. 76), an average of from 350 to 400 grubs (the larval or immature stage of the beetle) to the square yard is not infrequent.

FIGURE. 77.—Defoliation of apple tree by feeding of Japanese beetles

Despite this alarming rapidity of increase, it should be borne in mind that scarcely any other part of this country offers so favorable a combination of environmental conditions of temperature, rainfall, soil types, and host plants as is found in the present zone of continuous infestation. The insect, being a native of Japan, is evidently adapted to an insular rainfall. These conditions are in general most nearly approximated on our eastern seaboard, whereas farther inland, where prolonged summer droughts are of rather frequent occurrence, as well as extremes of heat and cold, the climate would appear to be less favor-

able. There is evidence that the Japanese beetle is adversely affected by droughts, especially if these come at a time when eggs are being laid and hatched. Furthermore, data at hand seem to indicate that the maximum-infestation peak in a given locality may remain at the high level for only a relatively few seasons, and be followed thereafter by a noticeable decline to a lower level of abundance and destructiveness.

FIGURE 78.—Japanese beetles clustered on ripening peaches

Host-Plant Groups

Observations over a period of years have shown that, while the Japanese beetle will feed upon more than 250 species of plants, the preferred food plants number only from 35 to 40. The fruit trees most subject to attack are the apple, quince, peach, cherry, and plum. (Figs. 77 and 78.) Not only is the foliage attacked but the fruits as well, especially of the early ripening varieties. The pear is an outstanding exception, both foliage and fruit apparently being almost entirely immune to beetle attack. Among the plants bearing small fruit, the grape, raspberry, and blackberry are most subject to attack, especially the grape; the fruits of these varieties, however, are rarely, if ever, eaten by the beetle.

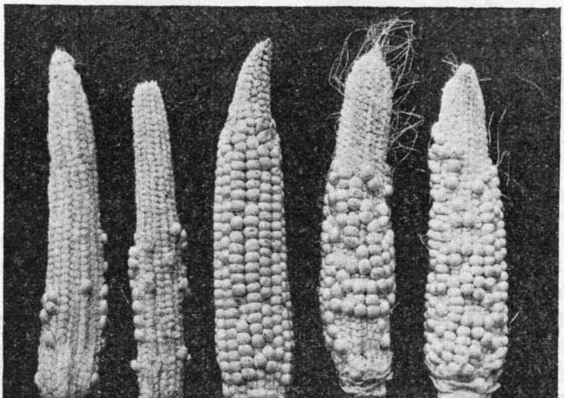

FIGURE 79.—Typical imperfect pollination of corn resulting from Japanese beetle feeding on silk

Truck crops are seldom seriously injured by the beetles, though in restricted areas of exceptionally heavy concentration beetle damage to foliage or blossoms of rhubarb, peas, beans, and similar garden crops may at times be quite severe. Sweet corn is a noteworthy exception to this rule; the foliage suffers but

little in most instances, but the green silk is very attractive to the beetles and is fed upon extensively, the result being to prevent, or to seriously interfere with, the pollination of the ear. (Fig. 79.) In commercial plantings the reduction in recent years in marketable ears as a result of this feeding has run as high as 100 per cent.

In recent years it has been found that the grubs at times feed rather extensively on the roots of various truck crops. Appreciable damage to the roots of such crops has frequently been observed even when the crops were growing in well-cultivated plots or fields. Examples of plants suffering such damage are strawberry, sweetpotato, beet, eggplant, tomato, and carrot.

Among field crops, beetle feeding of any consequence is limited to corn, soybean, and red clover. Injury to field corn has been increasingly observable in recent years, particularly in parts of eastern Pennsylvania; this crop frequently suffers in the same way and nearly to the same extent as sweet corn. Severe injury to soybean has also been noted in a number of instances.

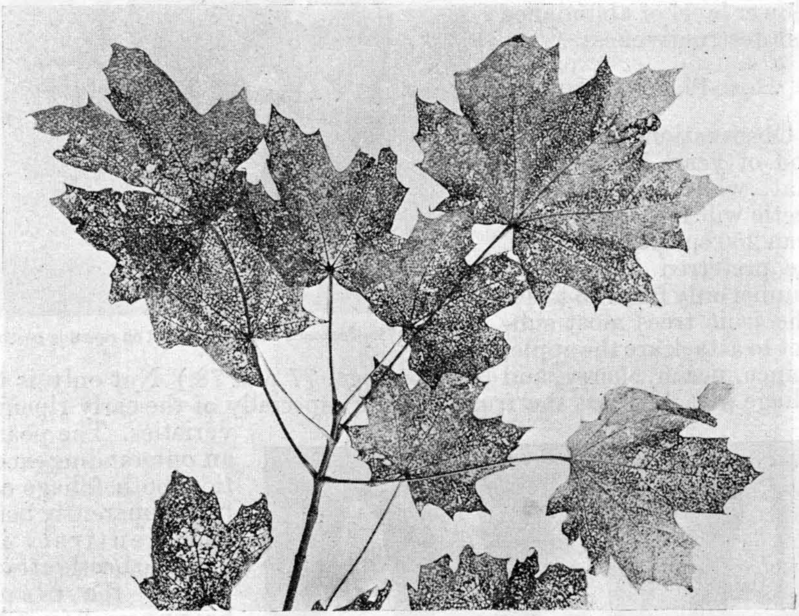

FIGURE 80.—Characteristic skeletonizing of foliage by Japanese beetles

In the group comprising ornamental trees and plants, shade trees are favored food plants of the beetles. The varieties most commonly attacked are sassafras, linden, elm, horsechestnut, Lombardy poplar, and willow. Conifers are practically immune, with the exception of larch and bald cypress, which are frequently almost completely stripped. Forests, however, can be considered as completely immune to beetle attack. Many ornamental flowering shrubs and plants, including shrub althea, rose, hollyhock, butterflybush, evening-primrose, dahlia, phlox, and aster, are generally and regularly attacked. Foliage injury is quite consistently typical; defoliation is not immediate, but the leaves are first skeletonized, then turn brown, and are soon shed. (Fig. 80.) Flowers are riddled by the beetles feeding on and perforating the petals.

It is generally believed that the eggs of the Japanese beetle are for the most part deposited in grassy areas, and seldom in cultivated ground. However, there have been observed a number of instances of severe grub injury to the roots of some varieties of nursery stock growing in well-cultivated plots in commercial nurseries (fig. 81); the varieties affected include azalea, rhododendron, arborvitæ, and hemlock. The injury is due not so much to grubs feeding on the rootlets as to the girdling of the main root at a depth of from ½ to 1½ inches below the surface of the ground. Even when girdling is not complete, the partial injury to the top of the plant, making it unsalable, is equivalent to a total loss from the standpoint of the commercial grower.

FIGURE 81.—Girdling of stem of nursery plant (indicated by arrow) caused by Japanese beetle larvæ

Parasites

In spite of the fact that the beetle has been abundant in the central area of infestation for more than 10 years, and while some species of the native white grubs or June beetles present in limited numbers in this area are attacked by native parasites to some extent, there is little evidence so far that these parasites have attacked, or are likely to attack, the Japanese beetle in either its adult or larval stage.

Of the 15 species of foreign parasites of the beetle which have been introduced into New Jersey from time to time since this work was started in 1921, 5 species have become established within the area generally infested by the Japanese beetle. These parasites belong to two general orders or groups of insects, the Diptera or fly group and the Hymenoptera or wasp group. The parasite species of the former group do not find conditions quite so favorable for their development as do the latter; they apparently require a somewhat more northern habitat, where the life cycle of the beetle will conform more closely to the requirements of the parasite. However, the two species of parasitic wasps of the latter group give considerable promise, and numerous colonies have been liberated throughout the area of heavy beetle infestation.

Artificial Control Measures

Reasonably adequate control measures have been developed to protect foliage from beetle attack, chiefly by the proper application of

suitable sprays of stomach poisons or contact insecticides. Likewise, quite satisfactory methods have been devised for the "grub-proofing" of lawns and golf courses. (Fig. 82.) Several methods have been developed for handling or treating most of the types of nursery stock grown in the infested area, so that they may be shipped in compliance with quarantine requirements without risk of further dispersing the beetle. Measures have been perfected for treating or otherwise handling those farm, garden, or orchard products likely to carry infestation. A trap capable of catching large numbers of beetles has been developed, using as a bait a mixture containing oil of geraniol, which was found to be especially attractive to the beetle. Constant effort is being made both to improve those methods of treatment already devised and to develop new and better measures.

FIGURE 82.—Applying lead arsenate mixture for "grub-proofing" turf

C. H. HADLEY, *Bureau of Entomology.*

LAMB Becomes More Tender When Ripened By Period of Storage Ripening meat consists in hanging the fresh, chilled carcasses or cuts in cold storage for a period of days or weeks. Temperatures are held at about 36° F., and the relative humidity is kept fairly low so that the surface of the meat will remain dry. Consumers of beef long ago decided that ripening increases its tenderness and improves its flavor. As a result a considerable quantity of commercial beef is held in cold storage for from two to six weeks before delivery to the retail stores whose trade desires this ripened meat. Ribs, loins, and hind quarters of high-grade, well-fattened cattle are best adapted to ripening or aging.

Pork consumers, on the other hand, have indicated a definite preference for chops, loin roasts, and fresh hams that have not been ripened.

These market preferences for ripened beef and freshly chilled pork are in contrast with the lamb situation, in which no definite choice exists. Lamb is moved into the retail trade as promptly as possible to prevent a storage shrink in weight, but normally neither premium nor discount is made because of the length of that storage period. The few customers who desire their chops as soon as the carcass has been chilled about offset the few who ask that a hind quarter be "hung back" for ripening.

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These market preferences for ripened beef and freshly chilled pork are in contrast with the lamb situation, in which no definite choice exists. Lamb is moved into the retail trade as promptly as possible to prevent a storage shrink in weight, but normally neither premium nor discount is made because of the length of that storage period. The few customers who desire their chops as soon as the carcass has been chilled about offset the few who ask that a hind quarter be "hung back" for ripening.

In connection with the meat-research program conducted by the Bureaus of Animal Industry, Home Economics, and Agricultural Economics, of the Department of Agriculture, together with 26 State agricultural experiment stations and several other livestock and meat agencies, legs from several hundred lambs have been roasted annually in recent years and tested for tenderness, flavor, and other factors of palatability. Some of these legs were cooked and sampled within two days after the lambs were slaughtered. Others, forced to wait their turn in the cooking laboratory, were held in cold storage for varying periods up to 25 days.

Large Quantity of Data Summarized

The palatability records of 1,222 of these legs have been summarized to study the effect of ripening upon the tenderness of the meat. Comparisons were made to see whether the consumer would obtain a more desirable product from lamb that was freshly chilled or from lamb that had been ripened for a definite length of time.

The 1,222 legs used in this summary came from 1,222 different lambs. In contrast to subsequent tests, described later, of pairs of legs, the selection of the legs in this part of the experiment was on a strictly random basis. Almost every age, breed, grade, and feeding method were represented and groups of the legs were cooked after varying periods of storage, as shown in the graphs. The number of lambs is so large that the summary of their tenderness records should show the effect of ripening upon the eating quality of the meat in spite of variations due to other causes.

All these 1,222 legs of lamb were cooked and sampled under as nearly the same conditions as could be maintained, according to the directions given in the project outline of cooperative meat investigations. Every leg was roasted skin side down and cut flesh side up in an open pan on a rack, without seasoning, without added water, and with the fell left on. Every leg was seared for 20 minutes in a very hot oven averaging about 510° F. (265° C.) then finished very slowly at 257° F. (125° C.), until a meat thermometer kept in the thick portion of the leg reached 169° F. (76° C.). Each was carved while hot.

A committee of four or five experienced judges ate slices from the inside muscle of the leg (semimembranosus) for the purpose of describing its aroma, flavor, juiciness, and tenderness. The judges used the cooked-meat grading chart adopted for the cooperative meat investigations project. After thoroughly chewing the meat, each judge graded its tenderness by one of the following word descriptions: Extremely tough, very tough, tough, slightly tough, moderately tender, tender, very tender. These word descriptions are a means of placing each leg of lamb on a 7-point scale of tenderness between the extremes of tenderness and toughness. Slightly tough may be looked upon as a mid-point, or average, of the total range between extremely tough and very tender. For convenience in averaging the tenderness grades given to a leg of lamb by several judges, numbers from 1 to 7 have been arbitrarily assigned to the word descriptions. By this system each leg of lamb receives a numerical measure of tenderness, or score, which is the average of the opinions of several judges.

Mechanical as Well as Chewing Test Used

In addition to the chewing test as a measure of tenderness, there was also a mechanical test. Samples taken from the inside and outside muscles of the leg (semimembranosus and biceps femoris, respectively) were tested for resistance to shearing by a specially designed instrument which registered in pounds the force required to shear through the meat sample. For brevity, the observation was recorded as "shearing strength." Low tenderness scores given by the judges are associated with high resistance to shearing and high tenderness scores are associated with low resistance to shearing.

The tenderness records of the 1,222 lamb legs were averaged in groups for each day for from 2 to 10 days after slaughter, and thereafter for 5-day intervals. The data for judges' scores and shearing strength are shown graphically in Figures 83 and 84. During the first 10 days of storage the meat increased in tenderness on the average from slightly tough to moderately tender, or over one grade, as indicated by the judges' scores. After 10 days the meat continued to be moderately tender, with slight fluctuations up and down. This same general trend was recorded by the mechanical test.

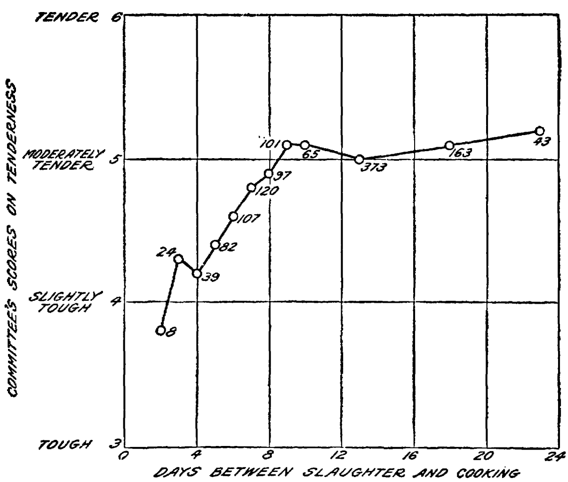

FIGURE 83.—Effect of ripening on tenderness of 1,222 cooked lamb legs, as determined by judges' scores. Figures at points on curve show number of lambs tested

Since the methods of grading and testing meat for tenderness used in these lamb studies were new, additional tests were made to check these methods and to determine whether they would accurately compare the variations in palatability. Forty-eight pairs of legs of lamb were used in such tests. Corresponding lefts and rights from the same carcasses were cooked and tested on the same day to see whether the committee and the tenderness machine could give comparable reports on meat that was similar. The results both by judges and by mechanical tests revealed no significant difference between the average tenderness of the 48 left legs and that of the corresponding 48 right legs. Not only were averages similar but variations for one particular leg were also observed in the committee gradings and tenderness test of its mate.

Methods of Testing Found to be Reliable

In view of these results it appeared that the methods used were showing the differences in the meat and that, on the average, ripening actually did improve the tenderness of lamb as shown by the preceding summary of the 1,222 legs.

To check this still further a special experiment was conducted in which the left legs from 60 lambs were cooked and tested within 2 to 6 days after slaughter and the corresponding right legs were held 12 to 21 days after slaughter before being cooked and tested by the same method. The data made possible a study of effects produced by ripening periods of different lengths for the same kind of meat. Of 60 legs stored for the longer periods, only 3 were less tender than their mates stored for shorter periods and these differences were small. The results obtained confirm those indicated by the 1,222 individual samples, shown in Figures 83 and 84.

The combined results show that, on the average, lamb legs become more tender if held in cold storage for from 7 to 10 days after slaughter. Tenderness changes but slightly during the next 10 days, and the mechanical test showed a small decrease in tenderness beyond 20 days of ripening.

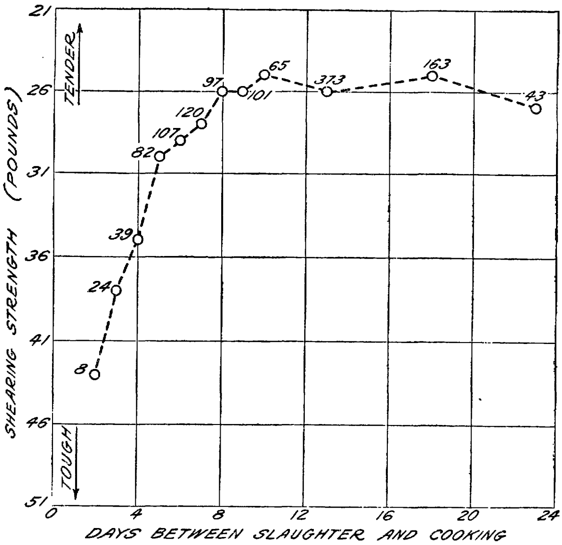

FIGURE 84.—Effect of ripening on tenderness of 1,222 cooked lamb legs, as determined by mechanical test. Figures at points on curve show number of lambs tested

Of special interest is the fact that the meat from individual lambs ripened the same number of days varied widely as to tenderness. From the group of 1,222 left legs of lamb and the 60 pairs of legs, of those stored for 3 days, the meat ranged from very tough to tender; for 10 days it ranged from tough to very tender, and for the 16 to 20 day interval from slightly tough to tender. These individual ranges serve to explain why the average differences in tenderness resulting from storage for varying intervals are not greater than they appear in Figures 83 and 84.

Of special concern to lamb producers is the observation that "green" meat from some lambs was tender and fully ripened meat from others was not. In other words, some of the lambs possessed a natural tenderness that was lacking in the others. There seems to be a real opportunity for the lamb industry to improve its product by research that would discover and develop the blood lines and management methods that produce the more desirable product.

K. F. WARNER, *Bureau of Animal Industry.*
LUCY M. ALEXANDER,
Bureau of Home Economics and Bureau of Animal Industry.

LAMB Grading at Point of Origin Compensates Producer for Quality With the growth and development of agricultural extension and educational facilities, the wide distribution of economic and market information, and the cooperative movement, a greater appreciation of quality in agricultural commodities and products has developed among the farmers throughout the United States. Until a few years ago (and in many States and communities even at the present time), it was a common practice among sheep raisers to sell their lambs at the farm for a flat price per head or per hundredweight. This system of selling presumes that all lambs in a flock are quite similar in such characteristics as conformation, finish, and quality and should therefore sell for the same price.

The realization among sheepmen that all lambs have not the same characteristics has been largely responsible for the development of a system of marketing whereby lambs are assembled in the country at a concentration or shipping point and sorted into grades having similar characteristics, then sold upon this basis either at the concentration point or after being shipped to a central livestock market. This system of marketing does not suppose that graded bands of lambs will net more money than they would if a buyer were to pay a flat rate per hundredweight for the same band of lambs. If sold according to grade there would be a wide range between the price paid for the lambs of high grade and that paid for those of low grade. If, however, they were sold at a flat price per hundredweight, the price received would be between that paid for high and low grade lambs, depending upon the buyer's estimate of each grade represented in the band of lambs. Should this band of lambs belong to one producer, the importance of grading might not be so great. However, in the farm-flock States, producers do not have lambs in sufficient numbers to make individual shipments to market. It is necessary that several producers pool their market lambs in order to effect economies in shipping expenses.

In pooling lambs for shipment it is obvious that lambs from different flocks are not similar in such characteristics as conformation, finish, and quality. Lambs from the same flock differ in these respects. Yet, the producer marketing Choice grade lambs receives the same price as the producer marketing Medium grade lambs, under the flat price per hundredweight method of buying and selling. This method of dealing violates the principle of selling lambs on their merit, since it causes high-grade lambs to sell below the prices that could be obtained if they were sold separately from the lower grades, and it destroys much of the incentive to produce lambs of superior quality. Under a system of marketing by which the lambs are graded at the point of origin these inequalities in price are avoided.

Marketing lambs by grade has been practiced rather extensively for several years in Missouri, Kentucky, and Tennessee. The enthusiasm of sheep producers for this method of marketing, and its growth, are the best evidence that it is sound and practical. Grading lambs at country assembly points has a great many educational features that are proving beneficial. It enables producers to learn the standards for the different grades of lambs. It clearly demonstrates that breeding, feeding, and management are factors involved in producing the highest grades of lambs. It creates a desire among sheepmen to produce better lambs because of the higher price which they command, and finally it provides ample proof that a painstaking shepherd is well rewarded for his efforts.

M. T. FOSTER, *Bureau of Agricultural Economics.*

LESSER Peach Borer Killed with Paradichlorobenzene Dissolved in Cottonseed Oil

The lesser peach borer has been regarded as an important peach insect for at least 25 years, and during recent years it has caused much damage to some peach orchards. The insect has a decided preference for peach trees, which are its favored hosts, although other known food plants are plums and cherries (both cultivated and wild), the black-knot fungus on plum and cherry, Juneberry, beach plum, and chestnut.

This borer invariably works in areas on the trunks or limbs of peach trees that have been injured by implements, harness chains, low temperatures, cankers, or sun scald, and in crotches or under loose bark of old trees. Frequently it is found working around a pruning wound which has failed to heal properly. Orchards that have been somewhat neglected or those in which there are injured or diseased trees are the most subject to attack. Injury is due to the destruction of the cambium and inner-bark layers by the feeding of the larvæ, and usually a considerable quantity of gum is found exuding from infested areas. In severe cases limbs may be entirely girdled and killed, or the trunk may be honeycombed by the work of the larvæ, and in practically all cases the trees are weakened. Injury is confined largely to old trees, since the larvæ apparently prefer to work in areas where the bark has been injured in various ways, and at old crotches.

Frequently the lesser peach borer has been confused with a somewhat larger species known simply as the peach borer. This confusion is not surprising, for the two insects are closely related and are much alike in both the larval and adult stages. They are two entirely distinct pests, however, and work in different parts of the tree, the lesser borer confining its attack to the limbs and upper trunk whereas the larger borer attacks the trunk at and below the soil level and is sometimes found working in the large roots.

Former Method of Control

The use of paradichlorobenzene crystals is now a well-established means of controlling the peach borer, but the only control hitherto for the lesser peach borer has been to cut the larvæ out of their burrows with a knife. Hand worming is unsatisfactory, and since the trees are seldom killed by the attacks of the lesser borer, even this measure has not been generally practiced. Consequently, heavy infestations, expecially in old orchards, are not uncommon. The lack of a good method of controlling this important peach insect attracted the writer's interest in 1924. Observations and experiments were therefore started in that year and have been continued until recently when, as a result of these investigations, paradichlorobenzene dissolved in crude cottonseed oil was announced as an effective and practical remedy for the insect.

Method of Treatment

This new insecticide, which the Department of Agriculture is now recommending for the control of the lesser peach borer, should be used in the proportion of 1 pound of paradichlorobenzene crystals to 2 quarts of crude cottonseed oil. Oil from any southern cotton-oil mill will be satisfactory for making the insecticide. In cool weather the oil may have to be warmed before all the crystals will dissolve, and some recrystallization may take place if the insecticide is stored

during cool weather; however, the crystals will dissolve again when warm weather returns. The container should be tightly stoppered if stored, to prevent the loss of the active ingredient.

The insecticide should be applied to the infested areas with a paint brush. (Fig. 85.) Treatment should extend for a few inches beyond the edges of borer indications, and the areas should be thoroughly soaked with the insecticide. Only infested areas should be treated. The insecticide should not be used over the entire trunk or on whole limbs, or on healthy tissue at places other than on the borders of infested areas. It should be applied either in the fall or spring. Fall applications have an advantage over those made in the spring in that they kill the borers before they are full grown and prevent their working in the trees during the fall and the warm periods of the winter. On the other hand, the results of experiments indicate that the percentage of borers killed by applications in April is a little higher than by those made in October. It is not necessary to remove the gum, frass, or loose bark from infested areas before applying the wash.

FIGURE 85.—Peach trees being treated with paradichlorobenzene dissolved in cottonseed oil for control of the lesser peach borer

OLIVER I. SNAPP, *Bureau of Entomology.*

LOGS from the Wood Lot May Be Sold Profitably on a Log-Grade Basis Small timberland owners are at a disadvantage in selling their logs, because they usually have only a general idea of the comparative value of the different classes of logs. When a farmer delivers logs to a mill yard he frequently bases his selling price on his labor cost plus a charge for the timber, which practically ignores the value of the stumpage. His price should equal the difference between the value of the lumber produced and the production costs of the sawmill operator plus a fair profit for manufacturing.

Selling on a log-grade basis should be advantageous to both the farmer and the sawmill operator. While the inferior logs would bring very little, larger and better logs would bring considerably more. Consequently it would generally be more profitable to save smaller trees for a more profitable cut later on, or to cut smaller trees into poles, fuel, or pulpwood.

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The value of logs depends not only on size but also on the amount of defect. The amount of defect has a marked influence on the amount of lumber produced, but little on its quality. Therefore no correction is necessary if the logs are sold on a net scale basis. If, however, they are sold on a gross scale basis, a percentage reduction on their value equal to the percentage of defect should be made.

One of the greatest obstacles in the way of selling logs on a grade basis is the fact that there are no standard log grades. In the absence of log grades and with the hope of partially overcoming these obstacles, the following simple quality classification for logs, based largely on the position they occupied in the tree, is offered: (1) Butt logs, (2) smooth logs, and (3) top logs. The first would include all butt logs 10 inches or larger, free from limbs or knots. The second would include all other logs 8 inches or larger that contain not more than one knot on the surface for every 4 feet in length of the log. The third would include all the other logs. They would be relatively coarse and knotty, and usually the top logs of the trees.

Grades Applied at a Southern Mill

The application of these grades was tried out by the Forest Products Laboratory at a southern mill cutting second-growth loblolly pine. Based on 1928 costs and values the operator could make a fair profit by paying $14.26 for butt logs, $7.08 for smooth logs, and $2.50 for knotty logs per thousand board feet, Doyle scale, with 3.5 per cent deduction for defects. Based on the percentage of the different types of logs brought to the mill the flat rate would have to be $9.71 per thousand, Doyle scale, to yield the same return to the farmer on his timber. If the farmer could dispose of his knotty logs elsewhere, the buyer could afford to pay $10.60 for butt and smooth logs. The figures quoted should only be used as a guide, for local conditions might lower or increase these figures considerably. For example, the price of pine logs sold at the mills in Arkansas as given by United States Department of Agriculture Statistical Bulletin No. 32 gives an average price of $10.43 with the individual sales varying from $8 to $18.

The spread in value indicated above between butt logs, smooth logs, and knotty logs holds fairly well in other species also. In northern red oak, for example, with a 12.5 per cent deduction for defects, butt logs are worth $27.90, smooth logs $18.30, and knotty logs $12.50; and in sugar maple with a 5.3 per cent deduction for defects the butt logs are worth $21 and the other logs about $11.20.

Some appreciation of difference in log qualities will help the small wood-lot owner to obtain a fairer price for his timber, but he must not forget to find out before he cuts his timber what the buyer will pay, what size and length he will accept, and how defective the logs may be.

Ray Miller, *Forest Products Laboratory.*

MEAT Prices at Retail Follow the Trend of the Livestock Market During 1931, when prices of all agricultural commodities were falling rapidly, the Department of Agriculture received many inquiries as to whether the lower prices received by livestock producers were being reflected in retail meat prices. In response to these many inquiries, the depart-

The value of logs depends not only on size but also on the amount of defect. The amount of defect has a marked influence on the amount of lumber produced, but little on its quality. Therefore no correction is necessary if the logs are sold on a net scale basis. If, however, they are sold on a gross scale basis, a percentage reduction on their value equal to the percentage of defect should be made.

One of the greatest obstacles in the way of selling logs on a grade basis is the fact that there are no standard log grades. In the absence of log grades and with the hope of partially overcoming these obstacles, the following simple quality classification for logs, based largely on the position they occupied in the tree, is offered: (1) Butt logs, (2) smooth logs, and (3) top logs. The first would include all butt logs 10 inches or larger, free from limbs or knots. The second would include all other logs 8 inches or larger that contain not more than one knot on the surface for every 4 feet in length of the log. The third would include all the other logs. They would be relatively coarse and knotty, and usually the top logs of the trees.

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ment analyzed retail meat prices at New York City. The assembling of adequate and comprehensive data on retail meat prices to present a true picture of the retail market throughout the country is a difficult task, since meats vary widely in grade and are sold in various styles of cuts in thousands of stores with different kinds of customer service. This report, therefore, deals with only one grade of carcasses sold at New York by stores on a cash-and-carry basis with some delivery and credit service.

The retail meat prices were collected twice a month from the retailers and the mean of the range of the quotations as reported for each cut was computed and used as the average price for that particular retail cut. In the case of beef, prices were collected on the six more important cuts, i. e., porterhouse, sirloin, and round steaks, and rib roasts, chuck roasts, and plate beef; for lamb, prices are for the leg, loin, and rib chops and stew meat. In neither case do the above cuts comprise the entire carcass, consequently prices were calculated for the remaining cuts, i. e., flank, blade rib roast, brisket and shoulder of beef, and square chuck of lamb, by using a retail price differential more or less common to the New York retail market.

Method Used in the Analysis

The prices for the 10 cuts of beef were then used for computing a weighted composite retail price per pound of the total salable beef in a carcass, making allowance for the usual trimming and boning done by the retailer. Based on numerous tests in which cuts were given a fairly close trim, the salable beef represented about 79.75 per cent of the carcass weight, the remaining 20.25 per cent represented shrinkage, fat, and bone trimmings. The same procedure was followed in computing the composite retail price of lamb, and in this case, the salable portions equal 97.5 per cent of the carcass weight.

Having the composite or average retail price of cuts from a Good grade steer carcass, based upon the semimonthly and monthly retail price quotations, the total retail value of a carcass was computed. The packers have given an average dressing percentage of 58 per cent to Good grade steers; thus a 1,000-pound steer will produce a carcass weighing 580 pounds, and from this carcass the retailer will be able to sell 462.5 pounds of trimmed retail cuts. Multiplying this weight, 462.5 pounds by the composite retail price, gives the total value of the retail cuts from a 1,000-pound live steer. To determine whether or not the price reduction of the live animal is reflected in the retail prices, it is necessary to compare the total value of the live steer with the total value of the retail cuts, because the prices of some individual cuts react just the opposite to the live steer market or the wholesale meat market at certain seasons of the year. Without taking into consideration the prices of all cuts from a carcass, the retail prices of only a few cuts may be very misleading and a true condition of the retail market can not be visualized from them.

Basis for Steer Values

In computing the value of a 1,000-pound Good grade steer, the average monthly quotations of the Chicago market were used, whereas the value of the 580-pound Good grade steer carcass was based upon the average monthly quotations of the New York wholesale meat mar-

ket, and the retail value was based upon the composite retail price computed from the retail quotations at New York. In the case of lamb, the same procedure was used except that the carcasses were taken as 48 per cent of the live animal, thus giving 480 pounds for each 1,000 pounds live weight, and 468 pounds as the weight of the trimmed retail cuts.

The accompanying charts (figs. 86 and 87) illustrate the monthly fluctuations in the value of the live animal, carcass, and retail cuts for the years 1929 to 1931.

The average value of a live steer for 1929 was $140.30, and for a carcass, $125.40, whereas the retail cuts gave a gross return to the retailer of $188.47, in comparison with returns during the first 10 months of 1931, when a steer realized $89.80, or a reduction of $50.50; carcasses

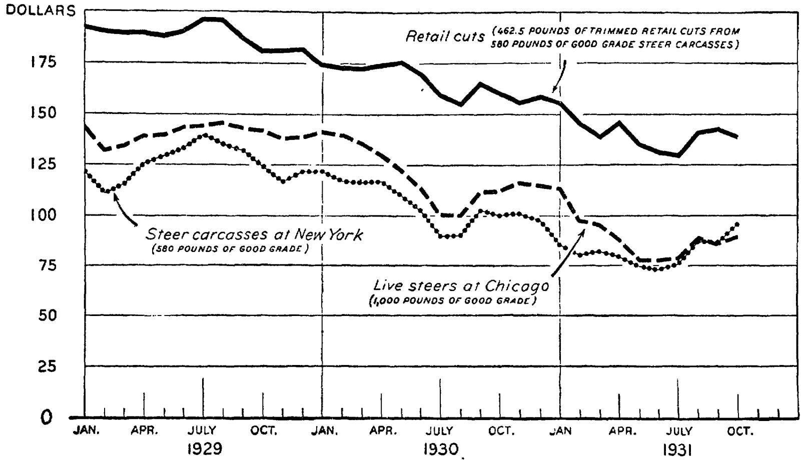

FIGURE 86.—Total value of live beef steers, carcasses, and retail cuts

$81.20 or a drop of $44.20; and the retail cuts $141, a decrease of $47.47. Comparing returns in 1930 with those in 1931, steers declined $30.20, carcasses $24.10, and retail cuts $25. In both cases there is evidence that the reductions that the packer allowed the retailer were passed on to the consumer. The reductions that took place on the live animal appear not to have been applied entirely to the carcass, consequently the reductions for the live animal and for the retail cuts are not comparable.

Margins Remain About Constant

The margins or the differences between the carcass value and retail value seem to remain about constant with some seasonal variations and a slight lag at times because of the lack of immediate changes by the retailer in reflecting the carcass changes in the retail cut value. There also appears to have been a general trend on the part of the retailer to narrow the margin during 1931 as compared with the margins the two previous years.

When considering lamb for the years 1929 and 1931, similar facts are observed. A comparison of figures for 1929 with those for 1931 shows a decrease in value of 1,000 pounds of live lamb of Good grade from $143.60 to $75.10, a decline of $68.50. Carcasses of this same grade

declined from $131.20 to $81, or $50.20, whereas the retail value dropped from $182 to $121.10, a decline of $60.90. Thus the retailers were allowed a reduction of $50.20 on the carcasses but lowered the value of the trimmed retail cuts by $60.90, apparently allowing the consumers a greater saving than that to the retailers by packers. For the years 1930–31 live lambs per 1,000 pounds had a reduction of $21.40, carcasses were reduced $18.60 for every 480 pounds, whereas the value of the 468 pounds of retail cuts was reduced $24.30.

The data presented here in chart form show that in general the value declines in the cattle and lamb markets in the last three years have been reflected in the wholesale meat market, although not completely so, because the value of the by-products have also been reduced and these outlets have absorbed part of the livestock value reductions.

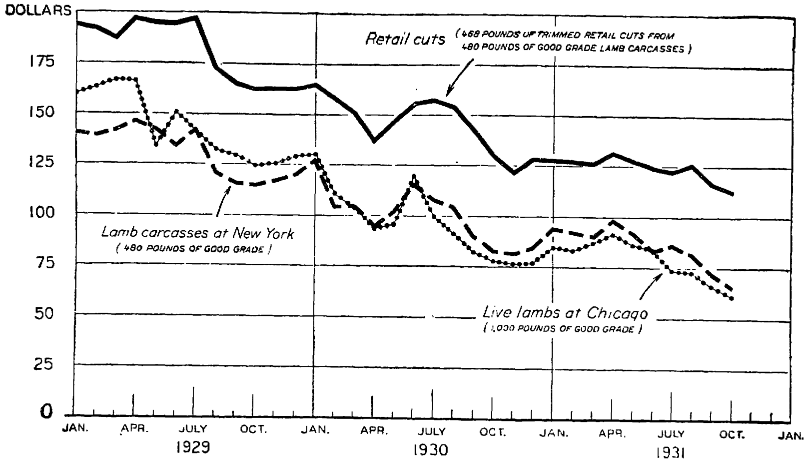

FIGURE 87.—Total value of live lambs, carcasses, and retail cuts

Although there is a tendency for the retail meat values to change more slowly than the carcass values, the reductions given by the packer are eventually passed on to the meat consumer.

A. T. EDINGER, *Bureau of Agricultural Economics.*

MEXICAN Bean Beetle Approaches Northern Limits of Distribution

Ten years after its discovery in the eastern part of the United States the Mexican bean beetle has apparently approached the northern limits of its distribution, at least from an economic standpoint. The new territory invaded during 1930 was relatively small, as indicated in the accompanying map. (Fig. 88.) No new States were reached and new records of distribution were obtained from only five States—South Carolina, Connecticut, Massachusetts, New York, and Michigan—the newly infested areas in the last two States being very small. During 1931 two new States, Vermont and Rhode Island, have been invaded, and some new territory has been infested in Indiana, Kentucky, and Georgia.

It is probable that the severe drought of 1930 may have retarded spread toward Illinois and farther into the lower peninsula of Michigan. However, Massachusetts, Connecticut, and New York were not so severely affected by the drought and it is believed that the spread

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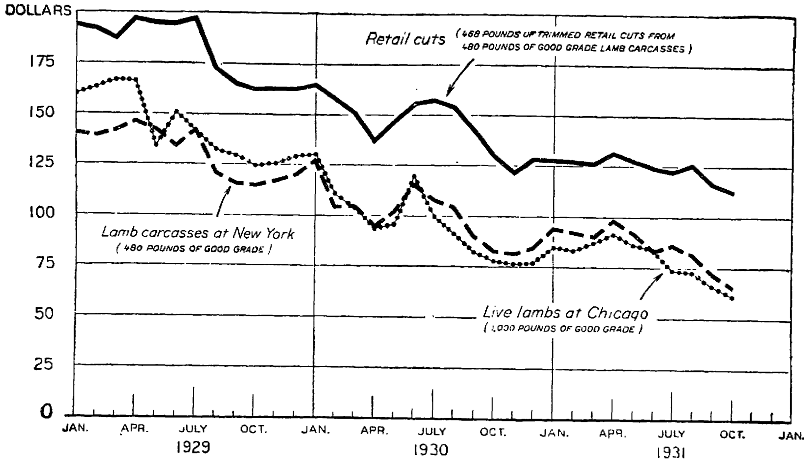

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It is probable that the severe drought of 1930 may have retarded spread toward Illinois and farther into the lower peninsula of Michigan. However, Massachusetts, Connecticut, and New York were not so severely affected by the drought and it is believed that the spread

there was normal. It is significant that for several years the beetle has not appreciably increased its range nor become more abundant along the northern limits of distribution, except in New England, and there essentially to the east rather than to the north.

Conditions in the Southern Range

On the other hand, in the more southern range in the Eastern States a long, relatively mild autumn prevailed and the beetle completed a brood after the late summer rains. The winter of 1930-31 was favorable to its hibernation, with the result that the percentage of survival was above the average in Ohio and New York and possibly in other States. At Columbus, Ohio, the winter survival was over 5 per cent and at Athens, Ohio, over 8 per cent, which is the highest of record. At the Arlington Experiment Farm, Va., the survival was over 18 per cent, as compared with 33 per cent in 1930 and 62 per cent in 1929, while at Norfolk, Va., the survival was almost average for that area, approximately 50 per cent. At Geneva, N. Y., only 1.42 per cent survived the winter, but this is relatively high as compared with less than 0.1 per cent in 1930.

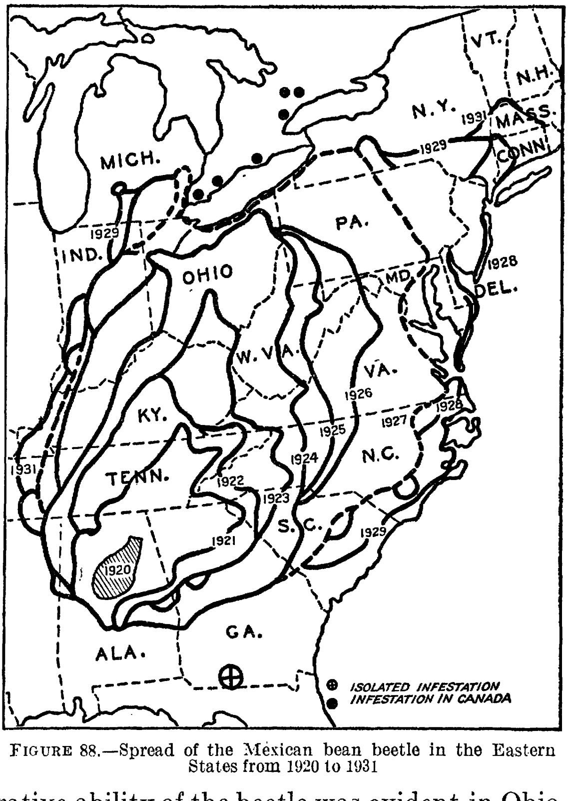

FIGURE 88.—Spread of the Mexican bean beetle in the Eastern States from 1920 to 1931

In general, fewer beetles than usual entered hibernation during the fall of 1930 owing to the effects of the drought, and the spring infestations were not so heavy. The remarkable recuperative ability of the beetle was evident in Ohio, Tennessee, Alabama, North Carolina, New Jersey, and Long Island. In these areas considerable damage was done early in the summer and control measures were necessary.

The experimental work on the control of the beetle has been continued and results indicate that spraying with magnesium arsenate gives the best protection to beans from damage by this pest.

This spray requires 2 pounds of magnesium arsenate per 100 gallons of water. It is necessary to use about 100 gallons of spray per acre. Ordinarily four applications, prior to the setting of the pods, will control the beetle. Spraying with an arsenical after the pods are set is not recommended.

NEALE F. HOWARD, *Bureau of Entomology.*

MILK and Cream Imports Raised in Quality by Federal-Control Law

The Federal import milk act is designed to regulate the importation of milk and cream into the United States for the purpose of promoting the domestic dairy industry and for the protection of public health. The act was passed by the Sixty-ninth Congress of the United States, approved February 15, 1927, and became effective 90 days latter. Following its enactment, it became necessary to institute a program of milk control that would bring all imported milk and cream within the provisions of the law. The standard as set forth requires: (1) That all cows producing milk or cream for importation into this country must be healthy, as determined by the tuberculin test and by physical examination at regular intervals by duly authorized veterinarians; (2) the sanitary conditions of dairy farms and plants producing milk or cream intended for shipment into the United States must be such as to score at least 50 points out of 100 points, according to the scoring methods prescribed by the Bureau of Dairy Industry; (3) certain definite bacterial limitations must be met by the producer of milk and cream before he can legally offer his product for entry; and (4) the temperature of the milk or cream at time of importation must not exceed 50° F.

Before milk or cream is offered for entry the shipper must hold a valid permit. The Secretary of Agriculture was given authority, under the law, to issue temporary permits to shippers pending completion of arrangements for the necessary inspections at source, and examination at ports of entry, to determine that all the provisions of the act had been met by the importer.

Active enforcement of the measure did not begin until the spring of 1928 and by June of that year a complete program of operation was being carried into effect. The Food and Drug Administration is charged with the responsibility of enforcing this law. Enforcement is centered in a station at Rouses Point, N. Y., since practically all importations of milk and cream originate in the adjacent Canadian Provinces. The enforcing agency consists of a station chief, a force of veterinarians, bacteriologists, clerks, and laboratory assistants.

Farms Inspected in Canada

Veterinarians of the Federal and Canadian Governments are constantly traveling through producing sections of Canada inspecting dairy farms and receiving plants to see that all sanitary requirements are fully complied with. Physical examinations of all cows producing milk or cream for United States delivery are made at regular intervals to detect the presence of disease and to exclude unhealthy animals from such milking herds.

Federal bacteriologists examine samples of milk and cream collected by the inspectors at the various ports of entry. These examinations are made by the standard plate count, authorized by the American Public Health Association, for determining the number of living bacteria per cubic centimeter. The standards as prescribed in the act demand that there shall be not more than 300,000 bacteria per cubic centimeter in raw milk, 750,000 in raw cream, 100,000 in pasteurized milk, and 500,000 in pasteurized cream.

An important development of the past year has been the removal of cows with diseased udders from milking herds. This was facilitated through the issuance by the Dominion veterinary director general of

an order, October 21, 1929, to the effect that no Canadian herd would be approved for American trade in which there were animals suffering from mastitis or other functional diseases of the udder.

As a result of the enforcement of the import milk act, milk and cream coming from Canadian sources to-day are of good quality, the product of healthy cows as determined by strict veterinary supervision and bacteriological analyses. The milk and cream not only come from healthy herds and are produced under improved sanitary conditions, but all of the product is effectively pasteurized and transported, as shown by the inspections made under Federal control.

H. B. SWITZER, *Food and Drug Administration.*

MINERAL Mixtures for Livestock Misbranded if Claims Are Excessive Within the last few years, there has been an unmistakable tendency on the part of certain manufacturers of mineral mixtures to make many unwarranted claims for their products. This has been particularly noticeable in collateral advertising and in claims made by salesmen selling products from farm to farm. The claims vary, but they usually give the impression that the feeding of mineral mixtures to farm livestock, including poultry, will cure or prevent serious infectious diseases, prevent or control worm infestation, expel worms, purify the blood, prevent bloating and digestive disturbances, cleanse the intestinal tract, and increase egg, milk, and meat production.

The Food and Drug Administration considers mineral preparations actually labeled in this manner as misbranded under the Federal food and drugs act and is instituting vigorous action to prevent interstate trade in such mislabeled products.

Adding to the feed of animals certain inorganic or mineral substances, such as calcium, phosphorus, sodium, potassium, chlorine, and small amounts of iodine, iron, and copper, may supply elements deficient in the ordinary ration. The use of such products will not, however, create a resistance against contagious or infectious diseases, nor is there a sound reason to believe that the feeding of minerals is effective in the treatment of such diseases.

The restoration of a proper balance in a mineral-deficient ration through the addition of certain needed minerals may result in normal egg, milk, or meat production when decreased yields are due to a shortage of minerals in the feed. Decreased yields, however, may be due to many other factors, such as poor environment, feeds deficient in vitamins or other food substances, or chronic infectious and parasitic diseases. The Food and Drug Administration, therefore, believes that claims that the use of minerals will stimulate the production of milk, eggs, and meat, create an erroneous impression in the mind of the buyer.

Many preparations containing quantities of soft coal have been widely advertised as having value in controlling worm infestation in hogs. Veterinary studies have shown that neither coal, nor any other mineral substance administered in the feed, has proved efficacious in the control of any type of worms infesting hogs or any other animal. While coal or charcoal appears to be highly palatable to pigs, neither has striking food value nor any recognized therapeutic value.

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A Self-Limiting Disease

The disease known as necro, or necrotic enteritis of swine, according to veterinary investigators, is more or less self-limiting in nature. Given proper sanitary precautions, spontaneous recoveries are not unusual in the early stages of the disease. In view of this fact, many manufacturers of mineral mixtures have attempted to create in the minds of hog raisers, through claims on labels or in advertising, the impression that minerals are very effective in the prevention and treatment of this disease. Such assertions are at variance with sound scientific facts. As a matter of fact, the use of inorganic minerals in the treatment of this disease may actually aggravate the condition, since the mucous membrane of the intestinal tract is highly inflamed, due to the irritation set up by the causative factor of the disease.

The Food and Drug Administration has investigated many products of this type and, in the enforcement of the law, has removed many from the market. However, the administration can, under the law, exercise control only over curative claims made on the labels of feeds and drugs shipped in interstate commerce or in the circulars accompanying such goods. Legal control does not extend to curative or preventive claims made in outside advertising—on billboards, in newspapers, farm papers, and other periodicals. It is suggested that the prospective buyer compare these representations with the statements printed on the labels themselves.

H. E. Moskey, *Food and Drug Administration.*

OFFICIAL Grading Service for Canned Fruits and Vegetables Inaugurated

For the first time the canning industry is being afforded an official canned fruit and vegetable grading service by the Federal Government. The industry has struggled for years with the problem of grading, but there was not an official service until an appropriation became available for it July 1, 1931.

Previous appropriation acts authorized inspection and grading services on fresh fruits and vegetables, poultry, dairy products, and certain other farm products. The appropriation act approved February 23, 1931, broadened the authority of the Department of Agriculture by changing the language to read "fruits and vegetables, whether dry, raw, or canned," and made available a small appropriation with which to inaugurate the service. Included in the item, as usual, is the further authority to "charge such fees as will be reasonable for services rendered and will as nearly as possible cover the cost for the service rendered."

Much study has been given to the subject of grading canned foods by the Bureau of Agricultural Economics in connection with the administration of the United States warehouse act. Various sections of the canning industry have cooperated with the bureau in an endeavor to formulate practicable grades with which the various qualities of canned foods might be evaluated and catalogued. With the cooperation of the industry, grades for several canned vegetables were promulgated under the authority of the United States warehouse act. Slight revisions in the grades are being made as they appear

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necessary and are being promulgated under the farm products grading law. These grades form the basis for the establishment of the new grading service.

Interested Parties May Request Grading

Under the regulations of the Secretary of Agriculture governing the service, any party financially interested in a given lot of canned fruits and vegetables may request that the goods be graded. Grading offices are being located at convenient points throughout the United States. The applicant may request the representatives of the department to draw the samples from the lots to be graded; the samples may be drawn by a licensed sampler; or he may submit the samples himself. In any event, the certificate of grade reflects the grade of the samples drawn. Fees are collected for each lot graded, based on the size of the lot from which samples are drawn. Since the certificate is "admissible in all courts of the United States as prima facie evidence of the truth of the statements therein contained," its value as a commercial document in supporting sales is readily appreciated. These certificates become of great importance to bankers or warehousemen who finance stored stocks of canned foods. They form a most satisfactory basis for use in the settlement of disputes which may arise over the quality of merchandise. Some concerns are now quoting their products in the terms of the United States grades and offer to support the delivery of their merchandise with certificates of grade.

The service is being manned by experienced men, all of whom are full-time employees of the Bureau of Agricultural Economics. The graders are carefully trained before taking up their duties.

Grading service is being carried on at Philadelphia; Chicago; Washington; Louisville; and Tulsa, Okla. A temporary field office was operated during August, September, and October, 1931, at Easton, Md. Applicants, however, may request that samples be drawn by any of the farm-products inspectors in the 50 stations in the principal markets of the country. The inspectors will, in turn, submit the samples to the proper grading office for certification. Temporary field offices may be located in the more important producing areas throughout the United States.

Heavy Demand from the Start

Although the service was not available until early in August, a very heavy volume of work was offered. Several Government departments requested the grading of samples of merchandise submitted to them in support of bids for their business, and requested grading of the merchandise upon delivery. The volume of grading for Government institutions alone has been quite heavy. The requests for commercial inspections from warehousemen, canners, buyers, etc., although the canning season was far advanced before the work was well under way, taxed the offices of the new project to their capacity.

Official grades are now available for canned peas, canned corn, both whole grain and cream styles, and canned tomatoes. Tentative grades have been drafted and are in use for canned beets, spinach, and mustard greens, Lima beans, snap (or string) beans, and sauerkraut. Studies are being carried on in connection with grades for additional canned vegetables as well as fruits.

PAUL M. WILLIAMS, *Bureau of Agricultural Economics.*

ORANGE Refrigeration in Ocean Transport is Best When Fruit is Precooled

Valencia oranges are exported in large quantities to England from California. To study the conditions affecting the refrigeration of the fruit in transit and the consequent effect on decay, representatives of the United States Department of Agriculture have accompanied a number of shipments from Los Angeles to English ports. Electrical thermometer equipment installed in the holds of ships made it possible to follow changes in fruit and air temperatures during the 28 to 33 days in transit.

Data accumulated and observations made show that the principal factors reducing the efficiency of refrigeration are (1) high temperatures of fruit at time of loading, (2) inadequate circulation of refrigerated air through the load aboard ship, (3) the customary use of air that is not sufficiently refrigerated, and (4) the reduction in the refrigerating capacity of the ship on account of the high temperature of the sea water encountered.

The peak movement of oranges for export occurs during the summer, when the temperature of the fruit may range as high as 80° F. If the fruit is shipped to the docks in iced cars, the temperature can be reduced 10 to 15 degrees, but the greatest temperature reduction is obtained by precooling the fruit at the packing house. The benefits of this initial cooling are readily apparent when it is considered that most of the available ships are not equipped to reduce the temperature of warm fruit in large holds more than 10 to 25 degrees during the first eight days of a voyage.

Air Circulation Aids Refrigeration

Circulation of air in fruit compartments increases the effectiveness of the refrigeration. The cold air enters at one side of the compartment and leaves at the opposite side after passing freely over the load and under the floor racks, and less freely through the load between the layers of boxes. The rate of movement of refrigerated air was found to have a very important bearing upon its effectiveness in cooling the fruit. Fifty changes of air per hour cooled the fruit in shallow compartments more uniformly and more rapidly than 30 changes per hour; reversing its direction every 12 hours likewise added to the effectiveness of the refrigeration.

The large lower holds are often 18 to 20 feet deep. The rate of cooling in them was found to be considerably slower than in the smaller shallow compartments. In some cases it was observed that much of the fruit in these large holds remained warm for two to three weeks; that is, for 50 per cent or more of its transit period. On account of the size and shape of these holds a much smaller proportion of the fruit is exposed to the free movement of refrigerated air over and under the stacks of boxes than in the smaller holds. In these holds over 50 per cent of the fruit is usually placed so that any cooling must come from refrigerated air traveling through the load. This is particularly serious if air circulation is not forced, as in the case of refrigeration from brine coils or from direct expansion pipes hung on the walls and ceilings of the holds.

Increasing the air space between the layers of boxes by increasing the thickness of the dunnage was found to permit more rapid and uniform cooling of the fruit. Dunnage 2 inches thick gave more satisfactory results than that only 1 inch thick.

The customary shipping temperature for oranges has been 40° F., but a comparison of the outturn of fruit carried at this temperature and of similar lots carried at 33° to 36° proved that the lower temperatures were preferable.

It was found that precooled fruit arrives in better condition than fruit loaded warm. With precooled fruit the task of maintaining low fruit temperatures was within the capacity of the refrigerating machinery, even in the lower latitudes near the Panama Canal and in the Gulf Stream, where the efficiency of the machinery was greatly reduced by the necessity of having to use warm sea water to cool the condensers. The high air temperatures encountered in this portion of the voyage also affected the temperature of the load, and it was found desirable to shade the decks of the boat with awnings to reduce the heat transferred into the interior.

W. R. BARGER, *Bureau of Plant Industry*

ORIENTAL Fruit Moth's Partial Control by Its Parasites Is Expected During the last few years the oriental fruit moth has become one of the most troublesome problems of peach growers in the eastern United States. It has caused very severe damage to the crop over wide areas, and as yet no generally effective control measures have been devised. Fortunately this insect is heavily parasitized, and in sections where it has been established longest, the increase in the degree of parasitism has been accompanied by a very marked decrease in the quantity of wormy fruit. More than 50 different species of parasites attacking it have been reported from the United States; 10 have been reported in Europe, 7 in Australia, and at least 17 species have been reported from Japan. Most of the parasite species known in any one of these four areas do not normally occur in any of the other three. The parasites of this pest belong for the most part to the well-known families of parasitic Hymenoptera. A few species, relatively less important, belong to the parasitic flies of the family Tachinidæ. Within the area of infestation in the United States species that are regarded as important controls in one peach-growing center may be entirely absent in another.

The Possibilities of Control by Parasites

The information already gained from investigations of the parasites of the fruit moth indicates that partial control of this pest by its parasites may reasonably be expected over a large portion of the area at present infested, to the extent of materially reducing the high degree of fruit infestation occurring when parasites are absent or scarce. An example of such a reduction has already been observed in southern New Jersey. During its first years of destructiveness in this area parasitism was low, and the wormy fruit among Elbertas frequently exceeded 50 per cent. During the last five years parasitism has been very heavy, frequently exceeding 90 per cent of the infestation in twigs, and the infestation in Elbertas during the last three years has not usually been more than 10 per cent of the fruit and in some orchards has decreased to 3 per cent. This condition occurs in spite of the fact that there is normally a heavy first and second brood infestation of twigs. It is quite probable that parasites will never completely control this pest, since even under the most favorable conditions there will

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always be a few worms escaping parasitic attack, and each worm renders a fruit unmarketable. It is self-evident, however, that a means of control that operates automatically to reduce the damage from 50 per cent to less than 10 per cent is greatly to the advantage of the peach-growing industry.

Increasing the Effectiveness of Control by Parasites

In considering the relation of parasites to the problem of control of the fruit moth in the United States, it is necessary to decide what might be done to increase the effectiveness of the parasites. Without doubt, one of the most important steps is the search for, and introduction of, foreign parasites to supplement those already here. Particularly, those species should be introduced which will attack the stages of the insect at present least heavily parasitized, notably the egg and cocoon stages, or which will be more effective than any of the natives in certain sections where our own species have shown a lack of heavy parasitism. During the last year five species have been introduced from southern Europe and colonized in the United States. It is too early to tell how many of these will prove valuable. Several other species from Europe are being considered for introduction, as well as the three most important parasites of the fruit moth in the infested area about Sydney in Australia.

Another possibility is the distribution of indigenous species which have proved valuable in one section of the United States into other sections in which they do not occur as parasites of the fruit moth. A small yellow hymenopterous parasite, called *Macrocentrus ancylivora* Rohwer, has become very abundant and valuable in orchards in the coastal plain strip from southern Connecticut to southern Virginia. During the last three years large numbers of this parasite have been reared at Moorestown, N. J., and distributed to 160 localities in all the important peach-growing centers east of the Mississippi River in which the parasite was not known to occur. Although it is yet too early to determine the value of this work, the results are highly encouraging. The parasite has been recovered from nearly all the centers in which it has been liberated. In some it has demonstrated its ability to winter over and to increase rapidly until the percentage of parasitism approximates that of the area in New Jersey from which it was distributed. Several colonies of two other indigenous species have been released during the past year in areas in which they do not normally occur. Only one species has yet been found present in all the peach-growing centers studied. This is *Macrocentrus delicatus* Cress. It parasitizes the fruit moth heavily in some sections, notably in eastern Tennessee, but is of minor importance in others.

A third possibility is the mass rearing and liberation in orchards of large numbers of parasites at such a time as strongly to supplement the normal stock in securing crop protection. The species which most readily lends itself to this treatment is *Trichogramma minutum* Riley, a common egg parasite of the fruit moth. A number of large-scale projects are under way in various sections of the country for the rearing and the liberation of this species against several insect pests. The efforts of the Bureau of Entomology on Trichogramma in relation to the fruit moth are at present confined to an attempt to prove whether any economic value can be obtained from such liberations.

H. W. Allen, *Bureau of Entomology.*

PACKAGE Bees May Be Used as Pollinating Agents in Orchards The use of bees to act as pollinating agents in orchards has received special attention during recent years owing to the fact that in many localities the supply of wild pollinating insects is not only proving inadequate for the task but is actually diminishing. Among the reasons for such a decrease are clean orcharding practices, the cleaning up of fences and hedgerows, the clearing off of forests, the draining of swamps, and forest fires and floods. The bumblebee is only one example of a useful insect now rarely found in many localities where once it was abundant.

It is fortunate for the orchardist that one of the most efficient pollinating insects is the honeybee. Roughly speaking, this is the only insect available to the orchardist to be used for pollinating purposes when he pleases, where he pleases, and in such quantities as he pleases.

In the past the orchardist has made use of full colonies of bees for his pollinating work. Usually these colonies were rented of some beekeeper or were owned by the orchardist himself. However, many orchardists are interested in bees only for the aid they render in pollination and do not care to go to the extra trouble and expense of managing colonies of bees during the remainder of the year. In many localities it is not feasible to rent colonies from beekeepers. In such cases the "orchard package" should prove of great value.

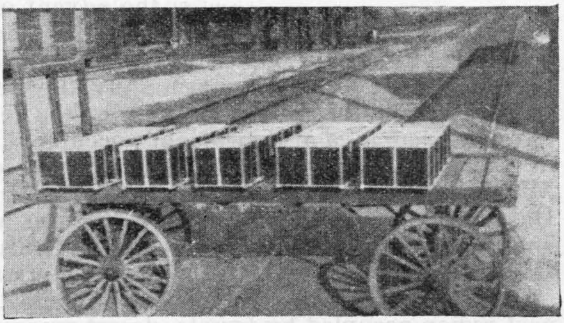

FIGURE 89.—Package bees ready for shipment

The orchard package has been a development in the package-bee industry during the last year or two. The package-bee industry first developed in response to the needs of beekeepers for worker bees to strengthen weakened colonies and to establish new colonies. "Package bees," to employ this term in its beekeeping sense, are bees shaken from their original combs into small boxes of light wood and wire screening. These boxes are provided with some device on which the bees may cluster, and with food—usually a can of sirup. Bees may be shipped long distances in such boxes. Package bees are produced chiefly in the Gulf Coast States and in California. For long-distance orders they are commonly shipped by express or mail. (Fig. 89.)

Orchardist's Task Simple

The orchard package is prepared as described for package bees in general, although some types contain a comb of honey. The chief purpose of most of these types is to provide sufficient food to maintain the bees during the period of pollination, since the bees are to fly directly from the package and are to have a queen. The flight entrance of the orchard package is already corked when the package is received. All the orchardist has to do is to set the package in his orchard just at the beginning of pollinating time and pull the cork to

let the bees out. At times it may be necessary to wrap the package in newspaper, roofing paper, or some similar material to protect the bees from cold.

The orchard package should contain not less than 3 pounds of bees. At least one package per acre should be used. The packages should be scattered separately through the orchard and should not be grouped together. Under favorable weather and floral conditions the bees are at work soon after the orchardist has opened the entrance of the package. When the pollinating season is over he may dispose of these packages to some beekeeper or otherwise.

Information as to where bees can be secured for pollinating purposes may be obtained from State beekeeping associations, State beekeeping officials, or the Division of Bee Culture of the Bureau of Entomology.

W. J. NOLAN, *Bureau of Entomology.*

PASTURE Lands of U. S. Vary Regionally in Main Characteristics In considering the pasture lands of the United States, a study of the native vegetation as it existed before the advent of the white man is very helpful. According to Shantz and Zon,[1] the native vegetation was originally divided into five main biological communities: (1) From the Atlantic coast to approximately the ninety-fifth meridian, the country was a vast and almost unbroken forest. (2) West of these forests was an area of prairie lands occupied by tall grasses, extending from central Illinois through northern Missouri, Iowa, and western Minnesota to eastern Kansas, Nebraska, South Dakota, and North Dakota. (3) Immediately west of this was a belt of semiarid, rather level lands bounded on the west by the foothills of the Rocky Mountains and occupied very largely by short grasses. (4) From this line to the Sierra Nevada and Cascade Ranges on the Pacific coast was a vast region occupied by forests, desert grasses, and desert shrubs, the forests being confined chiefly to the higher elevations. (5) The area west of the Sierra Nevada and Cascade Ranges was largely forests in the humid northern part. In the southern part, because of greater aridity, the forests were confined to the immediate coast line and to higher elevations of the mountain ranges, and the interior valleys were occupied very largely by desert shrubs and grasses. The characteristics and productiveness of pastures are correlated to a considerable degree with the original vegetation. (Fig. 90.)

Since the settlement of the Eastern States by Europeans a great part of the forests have been removed through lumbering operations or destroyed by fire. Much of the land thus cleared is now devoted to harvested crops, and of the 359,242,091 acres of crops harvested in the United States in 1929, approximately five-sixths are in the eastern humid region, which was originally largely forest land.

The fact that forested regions in their natural state are not useful as grazing lands has been established by centuries of experience. Therefore, the only natural pastures in the eastern United States were the prairie grasslands of Illinois, Iowa, and adjoining States. The native grasses in other parts of the eastern United States were of compara-

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[1] SHANTZ, H. L., and ZON, R. GRASSLAND AND DESERT SHRUB. 29 pp., illus. U. S. Dept. of Agr. Bur. Agr. Econ. Atlas of American Agriculture. Part I. The Physical Basis of Agriculture. Section E, Natural Vegetation. 1924.

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tively little value for grazing purposes. Throughout all this region however, excellent pastures have been established by the introduction of foreign grasses and legumes.

Use of Tame Grasses in Pasture Improvement

The improvement of pastures with tame grasses has been successful only in the eastern humid region and in the humid northern part of the Pacific slope. In the eastern United States the use of tame grasses is limited on the west by rainfall conditions. The rainfall limit for tame grasses at the Canadian boundary is approximately 18 inches; in South Dakota, 21 inches; Nebraska, 25 inches; Kansas, 28 inches; and Oklahoma and Texas, 30 inches. In its irregular course from north to

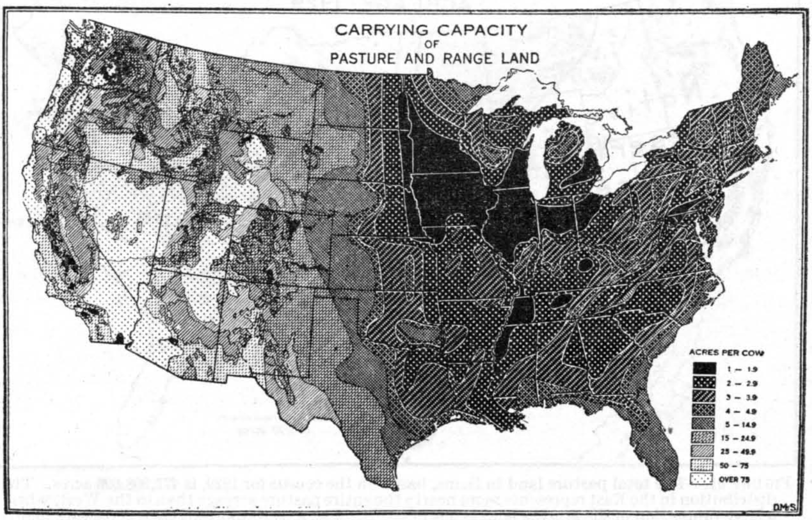

FIGURE 90.—Map showing carrying capacity of grazing lands in the United States. In the eastern half of the country, the map is based on reports from 9,000 farmers as to acres used per cow. In general, cows are given supplementary feed, and it is probable that the acreage required per steer without supplementary feed would be more than the amounts shown. The western half of the map outside the national forests was prepared by the Land Classification Board, United States Geological Survey, and within the national forests by the United States Forest Service. In the Southern States the map represents in general the carrying capacity of improved pasture

south the line of demarcation between the tame-grass and the native-grass pastures begins on the Canadian boundary at 99° west longitude, swings about 2 degrees east of south, and strikes the Gulf coast of Texas at approximately 97° west longitude. (Fig. 91.) The reason for the progressive increase of rainfall required from north to south is of course the interrelation of temperature and rainfall as these forces affect vegetation. The mean annual temperature at the Canadian line is 35° to 40° F.; in Texas it is 65° to 70°. West of this line very few tame grasses succeed until the Pacific slope of the Northwestern States, Oregon and Washington, is reached. In the dry interior between the Sierra Nevada and Cascade Mountains on the west and the western edge of the humid belt, livestock are almost wholly dependent upon native forage plants, except for very limited acreages of irrigated lands and especially favored rainfall areas such as those represented by the alpine meadows.

In the eastern half of the United States, where rainfall is not the limiting factor, there is a more or less indefinite line separating the distinctly northern grasses like Kentucky bluegrass, timothy, and redtop, from the southern grasses, such as Bermuda, carpet, and Dallis. The 60° isotherm very nearly marks this division line. (Fig. 91.) In the Great Plains and intermountain region rainfall is the controlling factor and temperatures play a secondary part.

Soil conditions control the character of pastures only where the rainfall is sufficient so that the soil qualities become operative. The nature of the soil has much to do with the type of vegetation in the eastern or humid part of the United States, where tame or introduced grasses provide so much of the pasturage.

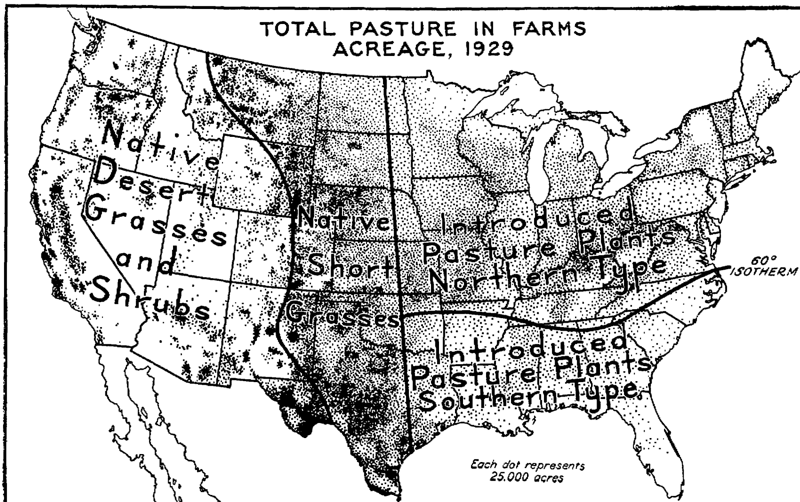

FIGURE 91.—The total pasture land in farms, based on the census for 1929, is 477,908,696 acres. The distribution in the East represents more nearly the entire pasture acreage than in the West, where a large proportion of the grazing land is not in farms. The most important class of pasture plants is indicated for each section

Extent and Productiveness of Pasture Lands

The distribution of the total pasture acreage as indicated by the census is also shown in Figure 91. Unfortunately the acreages given in the census reports include only the grazing land in farms, which represents but 36 per cent of the total grazing land. It is estimated, however, that these pastures in farms, including temporary pastures, supply the pasturage for 66 per cent of the total livestock. In the West the percentage of grazing lands not in farms is much greater than it is in the East because of the much greater areas of public lands in the West. However, in the Southeastern States such grazing land may become a factor in the support of livestock. The total pasturage on the vast acreage of cut-over lands in the piney-wood section of the Gulf States, much of which is not in farms, can not be ignored in any consideration of livestock production. From March until July, inclusive, such land has a carrying capacity of one animal unit for each 10 acres. The effective utilization of these lands will probably come through a combination of grazing and reforestation. The land outside of farms in the Northeastern and North Central States is not likely to be utilized to the extent to which similar land in the Gulf States will be util-

ized, because of the hardwood or broad-leaved character of much of this timber and the long winters, which not only make it necessary to provide much expensive harvested feed, but also require buildings to protect livestock from cold.

West of the ninety-eighth meridian, where the native grasses have been destroyed by cultivation or overgrazing, crested wheatgrass, bromegrass, and slender wheatgrass may be employed to good advantage in restoring such land to pasture uses. Nowhere in this region, however, is it advisable to attempt the improvement of grazing lands by replacing the native grasses with introduced species. Improvement is best accomplished by encouraging the better native forage plants through properly controlled grazing.

In the short-grass region, which is ordinarily designated the Great Plains, the grazing lands have an estimated average carrying capacity of one animal unit to 5 to 15 acres in the eastern one-third, and one

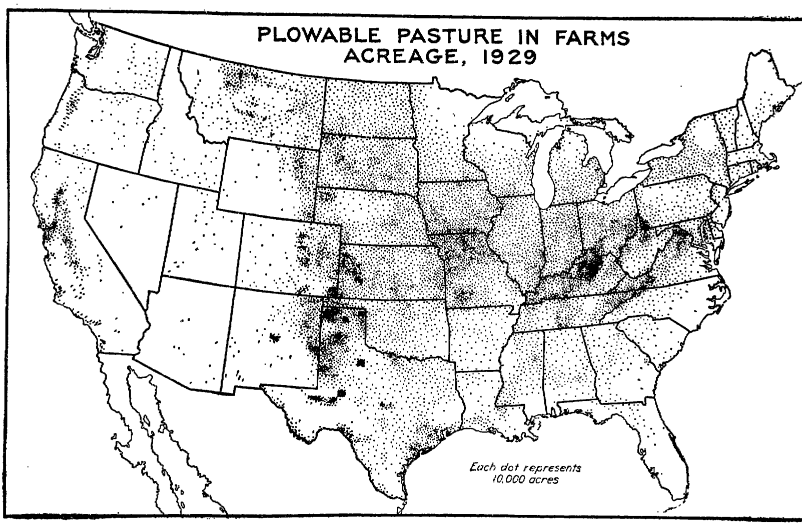

FIGURE 92.—Distribution in 1929 of plowable pasture land in farms, based on the census, is 136,515,489 acres. This part of the pasture acreage is not only the most productive in its natural state, but is capable of the most improvement

animal unit to 15 to 25 acres in the western two-thirds. (Fig. 90.) In the Great Plains there are, according to the Census Bureau, 187,-022,070 acres of pasture in farms, of which 38,111,591 acres are plowable. West of the Great Plains, in the Great Basin and intermountain region, are mostly semidesert lands, 25 per cent of which are rated as having a carrying capacity of one animal unit to 25 to 50 acres. The remainder of this region is occupied largely by desert shrubs such as sagebrush in the north and creosote bush in the south. On such lands 75 acres or more are required to support one animal during the grazing season. In this western section the Census Bureau recorded a total of only 115,962,712 acres of pasture land in farms, 8,564,927 acres of which were plowable, and 107,397,785 unplowable. A large percentage of the grazing land is outside of farms and therefore not included in the census enumeration.

In the eastern humid area north of the 60° isotherm there are 134,-021,394 acres of pasture land in farms; of this 77,946,250 acres are what the census terms plowable pasture. (Fig. 92.) This plowable pasture

is capable of improvement by fertilizer applications, and seeding with such grasses as Kentucky bluegrass, timothy, redtop, bromegrass, orchard grass, and clovers and lespedeza. Unimproved, such pastures have an average carrying capacity of one animal unit to 2½ acres, but they may be improved to a point where 1½ acres or less will suffice to support an animal unit.

The remainder of the pasture land in this section, 56,075,114 acres, is woodland pasture and land too rough or stony or wet to be available for cultivated crops. Such land is not sufficiently productive to justify any considerable expense in improving it. From 5 to 10 acres are required for each animal unit, according to conditions.

South of the 60° isotherm there are, according to the census, 40,902,520 acres of pasture land in farms; of this 11,892,721 acres are plowable pasture capable of being improved by the application of fertilizers and by being seeded with Bermuda, carpet, and Dallis grasses combined with lespedeza, hop clover, white clover, and black medic. The remaining 29,009,781 acres of the pasture land in farms is largely cut-over or burned-over forest land or land that is untillable for other reasons. Such land is occupied largely by native grasses, mostly Andropogon and Panicum species, and approximately 10 acres are required for each animal unit.

H. N. Vinall *and* C. R. Enlow, *Bureau of Plant Industry.*

PASTURES Should Supply a Larger Proportion of Feed Used by Livestock Fully 50 per cent of the feed for livestock in the United States comes directly from pasture and range. This is equivalent to saying that half of all the meat, milk, wool, hides, and horse and mule power is produced directly by grazing. That grass is the cheapest feed has been so generally accepted that not much effort has been made to prove it experimentally. Few direct comparisons have been made to show definitely the relative returns from land—(1) in cultivated crops raised to be harvested and (2) in permanent or temporary pastures intended for grazing. In general the policy has been to cultivate as much land as possible, leaving for pasture chiefly land unfit for cultivation because it is too rough, too dry, too wet, too poor, or otherwise unsuitable. If tillable land is used for pasture, the area is often limited to that barely sufficient to carry stock through the grazing season. Such a practice, of course, necessitates heavy feeding of harvested crops during periods of pasture shortage. Another consequence of limited pastures is that, when overgrazed (fig. 93), they do not begin to supply the maximum quantity of feed. In fact, the desirable forage plants are often greatly reduced or completely killed out by extremely heavy grazing. This is particularly true in areas of limited rainfall.

Experiments to determine the influence of various land rotations on the quantities of beef, pork, and mutton produced from a given area are in progress at the Illinois Agricultural Experiment Station. Four fields are being used, one of which is in bluegrass and the other three in 4-year and 5-year rotations of corn, small grain, soybeans, sweetclover, and the Haas pasture mixture. The Haas mixture, originated by Ralph Haas, an Illinois farmer, consists of 2 bushels of oats and 2 pounds each of sweetclover, red clover, rape, alsike clover, and timothy. It is sown in the spring and furnishes excellent grazing for two

is capable of improvement by fertilizer applications, and seeding with such grasses as Kentucky bluegrass, timothy, redtop, bromegrass, orchard grass, and clovers and lespedeza. Unimproved, such pastures have an average carrying capacity of one animal unit to 2½ acres, but they may be improved to a point where 1½ acres or less will suffice to support an animal unit.

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H. N. Vinall *and* C. R. Enlow, *Bureau of Plant Industry.*

PASTURES Should Supply a Larger Proportion of Feed Used by Livestock Fully 50 per cent of the feed for livestock in the United States comes directly from pasture and range. This is equivalent to saying that half of all the meat, milk, wool, hides, and horse and mule power is produced directly by grazing. That grass is the cheapest feed has been so generally accepted that not much effort has been made to prove it experimentally. Few direct comparisons have been made to show definitely the relative returns from land—(1) in cultivated crops raised to be harvested and (2) in permanent or temporary pastures intended for grazing. In general the policy has been to cultivate as much land as possible, leaving for pasture chiefly land unfit for cultivation because it is too rough, too dry, too wet, too poor, or otherwise unsuitable. If tillable land is used for pasture, the area is often limited to that barely sufficient to carry stock through the grazing season. Such a practice, of course, necessitates heavy feeding of harvested crops during periods of pasture shortage. Another consequence of limited pastures is that, when overgrazed (fig. 93), they do not begin to supply the maximum quantity of feed. In fact, the desirable forage plants are often greatly reduced or completely killed out by extremely heavy grazing. This is particularly true in areas of limited rainfall.

Experiments to determine the influence of various land rotations on the quantities of beef, pork, and mutton produced from a given area are in progress at the Illinois Agricultural Experiment Station. Four fields are being used, one of which is in bluegrass and the other three in 4-year and 5-year rotations of corn, small grain, soybeans, sweetclover, and the Haas pasture mixture. The Haas mixture, originated by Ralph Haas, an Illinois farmer, consists of 2 bushels of oats and 2 pounds each of sweetclover, red clover, rape, alsike clover, and timothy. It is sown in the spring and furnishes excellent grazing for two

seasons. The first season the pasture consists largely of oats, sweetclover, and rape; the second season timothy, alsike, and red clover furnish the bulk of the pasture, with sweetclover helping out. Though conclusions are not yet available, the experiments deserve close attention by stockmen.

Analyses of samples of young grass have shown that the quality of the feed can be changed greatly by fertilizers, particularly on impoverished soil, and much interest is being shown in this phase of pasture improvement. Many experiments relating to the use of fertilizers on old pastures and new seedings are under way in this country.

Experiments have also been designed by which to study pasture management, and tests involving rotation, grazing, deferred grazing, and continuous grazing are in progress. Supplemental grazing crops, such as Sudan grass, sweetclover, rape, soybeans, and others, are under grazing test to determine their relative value for supplying green feed

FIGURE 93.—Pastures that are too heavily grazed not only fail to yield maximum returns but also require the use of more expensive supplementary feed during periods of drought

during dry summer weather, when permanent pastures frequently drop in production. From the intense interest manifested in the experimental work under way, it is evident that farmers and others realize the importance of pastures in the economical production of livestock and livestock products.

The Hohenheim System of Grazing

Much interest has been shown the last few years in a system of grazing dairy cows on limited areas of pasture in Germany and England. The system, which was devised in Germany, is called the Hohenheim system and combines rotation grazing with intensive pasture fertilization. The grazing land is divided into from 6 to 10 pastures, each grazed in turn by high-producing dairy cows followed by low producers and dry animals. A complete rotation is made in from three weeks to one month. When the animals are removed from the pasture, nitrogenous fertilizers are applied to insure rapid growth of high-protein forage.

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The indications are that such practices are justified for milk production, where it is desirable to use high-priced land for grazing and where there is adequate and well-distributed rainfall.

The apparent success of this system in Europe has resulted in several trials in this country. The system, with various modifications, is under test at the State experiment stations of Massachusetts, Ohio, Michigan, and Wisconsin, and several dairy farmers are using modified forms of it in New England. A replication of the Hohenheim system as originally devised is under test at the United States Department of Agriculture experiment farm at Beltsville, Md., in comparison with continuously grazed pasture. This work is carried on cooperatively by the Bureau of Dairy Industry and the Bureau of Plant Industry.

Advantages of Fattening Livestock on Pastures

The Kansas and Ohio experiment stations have recently shown the rather remarkable advantages of fattening cattle on pasture as compared with fattening similar cattle in barns or dry lots. On the same rations of concentrates, pasture-fed cattle at the Ohio station gained 11 per cent more than barn-fed cattle and 16 per cent more than cattle fed in an open shed. As a consequence, the cost of gains for the pasture-fed cattle was correspondingly lower. The cost of silage and hay fed in dry lot was slightly more than the estimated value of the pasture. The pasture-fed cattle dressed practically as high as the cattle fed in dry lots.

At the Purdue (Ind.) and Mississippi stations, the high value of pasture has been brought out strikingly in lamb production. The grade of lambs and the palatability of the meat of lambs slaughtered when from 4 to 5 months old were influenced relatively little by grain fed as a supplement on good grass while the lambs were suckling the ewes.

Pastures also have an important place in profitable swine production. According to experiments conducted by the Bureaus of Animal Industry and Plant Industry at Ardmore, S. Dak., hogs fattened on pasture supplemented with concentrates, self-fed, may be expected to make approximately 10 per cent more gain than they will on the same feeds in dry lot. When fed in dry lots, hogs require about 10 per cent more concentrates per 100 pounds gain than do pasture-fattened hogs. The experiments also showed that when hogs were on pasture only 8 per cent of the feed consumed was tankage, whereas in dry lot 12 per cent of the rations selected by the hogs was tankage. In addition, the use of clean pastures in what is known as the swine-sanitation system materially reduces pig mortality and stunted growth and enables hogs to reach market weight practically free from parasites.

In the management of farm work stock, feed and labor requirements may be considerably reduced by turning the work animals on pasture at night during the grazing season. They may be kept advantageously on pasture with a reduced grain ration during short idle periods, and with no grain at all during long periods of idleness.

Ample Pastures Bring Benefits

In addition to such direct advantages in livestock production there are other important advantages in making maximum use of pasturage. Depletion of soil fertility is less rapid, since the animals' droppings are returned to the soil without loss and at no expense. On rolling

land, such as that in northern Missouri and southern Iowa, as much erosion takes place in one year on cornland as in about 47 years on bluegrass pasture.

The area of land used for hay and grain crops in the United States is almost five times that of land in improved pasture. Ten per cent of the cultivated-crop acreage sown to pasture would add approximately 50 per cent to the present area of improved pasture land. Such a change would reduce grain crops materially, reduce the labor spent for crop production, reduce erosion, provide more adequate pasturage for periods of drought, relieve pastures now overgrazed throughout the season, and preserve wood lots—all without increasing farm expenses or the supply of animal products. These results appear to be in general accordance with present sound agricultural practices.

A. T. Semple, *Bureau of Animal Industry*,
C. R. Enlow, *Bureau of Plant Industry*.

PEA-WEEVIL Damage Can be Decreased by Certain Farm Practices In sections where the pea weevil has been introduced, certain farm practices are largely responsible for the presence or absence of heavy infestations of the insect. Instead of focusing attention on the fumigation of the peas just before planting them, consideration should be given to the important points of (1) the time and method of harvesting the crop, (2) the treatment of the seed after harvest, and (3) the disposition of the peas left in the field as waste after harvest. Proper attention to these points will materially reduce the infestation in the next year's crop or will prevent the building up of heavy infestations.

Factors Governing Time and Method of Harvesting

The peas should be harvested as early as possible. Aside from consideration of the pea weevil, early harvest of most varieties is desirable to prevent loss from shattering, because the longer the peas stand after being ripe the more the pods are likely to split open and shed the peas. When pea weevils are present, it is more desirable to harvest early so that the crop can be fumigated to kill the contained weevils before they emerge and thus prevent further damage. Early harvest also prevents the escape of many pea weevils in the field. The weevils which escape seek shelter, hibernate, and come out in time to infest the next year's crop. Early harvest is possible only where the peas are planted alone or with another early maturing crop. The acreage should not be too large to be harvested quickly with the machinery and help available.

The method of harvesting must be determined largely by the size of the crop and by climatic conditions. Obviously, the methods would not be the same in a small garden and in a 500-acre field. Neither would they be the same in a windy section and in a wind-free section. Whether the crop is large or small, whether it is harvested by hand or by the most modern machinery, care should be exercised to reduce the loss from shattering as much as possible. If the peas are mowed and raked, these operations should be performed before the vines are overripe and while they are yet damp. Care should be taken not to trample the pea vines more than is necessary. A good track clearer should be

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used, so that the wheels of the mowers and rakes will shell out the minimum quantity of peas.

Where heavy windstorms are frequent at harvest time, heavy losses may occur if the peas have been cut and left in windrows or in piles, as the wind rolls the peas about in the field or even carries them away. (Fig. 94.) In such places it may be more economical to use headers for harvesting the peas. In sections where there is little danger from windstorms, combine harvesters equipped with pick-up attachments are very satisfactory. In either case care should be taken to leave as little of the crop on the field as possible. The fields should be properly opened so that the peas are not trampled down or left around the outer edges of the field. Threshing should not begin in the morning until the vines are dry enough to thresh well or many of the peas will go through with the straw. In some instances as many peas as were harvested, or even more, are left on the ground. Field counts have shown that from 500,000 to 3,000,000 peas per acre are wasted in this manner. The number of pea weevils thus left in the field to infest the next year's crop depends upon the percentage of infestation as well as upon the number of peas left.

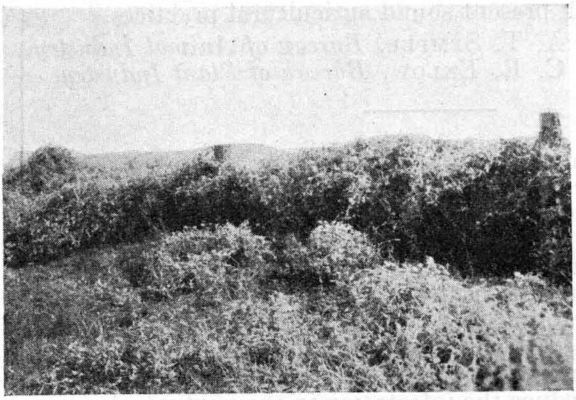

FIGURE 94.—Peas that have been rolled about by the wind

Fumigation of the Entire Crop Necessary

The entire crop should be fumigated. Under the present practices in some sections, as many of the weevily peas as possible are separated out at the cleaner. The peas that are supposed to be free of weevils are then fumigated and placed on the market, while the screenings, containing most of the weevil-infested peas, are not fumigated. Frequently the screenings are returned to the farm to be used as feed for livestock. The screenings are often sacked in a poor grade of sacks, some of which have holes that permit the weevils to escape and seek suitable shelter for the winter. Even when the screenings and weevily peas are ground up for feed, many of the weevils escape. The whole crop should be fumigated immediately after harvest and before it is cleaned.

Peas Remaining in Field Must Be Destroyed

As has already been pointed out, the loss of peas at harvest time is usually very great. The disposition of these unharvested peas is a very important problem in the control of pea-weevil infestations. The pea weevils in the harvested peas can be exterminated by fumigation, but those left on the field in the unharvested peas emerge and seek winter shelter. They are capable of withstanding low tempera-

tures and they select locations for hibernation where they are well protected from storms and from predacious enemies. They seem to prefer to hibernate under the rough bark of such trees as pines, firs, oaks, etc., and in the moss, liverworts, and lichens attached to the trunks and branches of the trees. They also hibernate in the cracks in fence posts and telegraph poles, and in cracks and under shingles of barns and other outbuildings. As many as 500 pea weevils have been found crowded into the cracks of one fence post adjoining a badly infested field. After living through the winter in these places, they come out in the spring to feed on pollen from different kinds of flowers until the pea pods begin to form. They are then ready to lay their eggs on the young pods.

In small gardens it would be an easy matter to care for the peas which are usually left. Peas which become too old and hard to be eaten green are often left on the vines without being harvested. If they are not being kept for seed, they should be destroyed before they ripen. The vines should be gathered and fed to livestock or destroyed, so that the contained weevils will have no chance to complete their development and emerge. Peas that are being grown for seed should be gathered as soon as they are ripe and fumigated immediately.

In large fields the problem is different, as the unharvested peas are on vines that were missed or else they are scattered on the ground so that they can not be gathered economically. Any practice is beneficial if it reduces the number of peas before the pea weevils have time to emerge. The warm ground and hot sunshine hasten the development of the pea weevils, so that they begin to emerge within a few days after harvest and in some sections they are practically all gone from the peas within two or three weeks. Therefore, anything that is intended to reduce the weevil population must be done immediately after harvest.

Sheeping off or hogging off the field immediately after harvest will prevent the emergence of some weevils, but will allow enough weevils to escape to infest the next year's crop. Immediate plowing kills some of the weevils, but allows many to escape.

From the standpoint of controlling the pea weevils the most satisfactory and thorough method of disposing of the unharvested peas is immediately burning the stubble on the field. This can be done very readily if the crop has been harvested with a header or a combine having a revolving fan for spreading the straw over the ground. Burning would not permit of the greatest utilization of the pea straw for feed and fertilizer, but in sections where weevil damage is the limiting factor it is better to lose the straw than to have to discontinue the growing of the pea crop.

Burning the hedgerows around the field in the fall will kill many weevils that have found shelter there, and will be a protection to the next year's crop. Before burning is attempted due precautions must be taken to prevent the fire from getting out of control and spreading to other crops and buildings. Usually, besides obtaining a fire permit, it is necessary to plow a few furrows around the outer edges of the field which is to be burned. Around fields that are removed from timber in which weevils can hibernate, metal fence posts are preferable to the ordinary wooden posts, in which hundreds of weevils can spend the winter. Metal fence posts also permit a more thorough burning of the hedgerows.

Farm practices which tend to reduce pea-weevil damage, then, are (1) early and careful harvesting of the crop, (2) thorough fumigation of the whole crop, and (3) immediate destruction of peas remaining on the field after harvest.

A. O. Larson, *Bureau of Entomology.*

PERISHABLE Commodities Act Promotes Prompt Settlement of Disputes The object of the perishable agricultural commodities act is to suppress unfair and fraudulent practices in the marketing of perishable agricultural commodities in interstate and foreign commerce. The act seeks to accomplish this by providing that commission merchants, dealers, and brokers must secure licenses from the Department of Agriculture and that violations of the act may be punished by publication of the facts or by suspension of the offender's license for a period not exceeding 90 days or by both publication and suspension. For repeated or flagrant violations an offender's license may be revoked. If a complainant can demonstrate that he has suffered damages because of the action of an offender the Secretary of Agriculture can issue a reparation order in the amount of damages.

Complaints may be filed under this act in person, by telegraph, by telephone, or by mail. For the most part complaints are filed by telegraph or by mail, about 40 per cent being filed by telegraph and 60 per cent by mail.

Practically all of the complaints filed by telegraph relate to cars which at the time are standing on track and on which quick action is desired. Most of such complaints pertain to rejections of cars by receivers, but there are many instances of receivers complaining against shippers on the ground that the goods in the cars on track fail to comply with the specifications set forth in the contract. The department gives prompt attention to telegraphic complaints and in most cases succeeds in effecting a settlement. If an amicable settlement can not be reached the complainant is advised that a formal complaint from him will be entertained if he has the evidence to support it.

Complaints received by mail relate to transactions in which the goods in question have been disposed of, immediate action therefore not being necessary. These cases may cover cars which were rejected and sold by the shipper for the receiver's account, cars refused by the receiver on account of alleged failure to deliver in accordance with the contract, cars accepted by the receiver but which he claims did not comply with the contract, shipments for which payment has not been received or regarding which it is felt an incorrect accounting was rendered, or cases of making false or misleading statements regarding the quality, quantity, or disposition of, or the condition of the market for, any perishable agricultural commodity received in interstate or foreign commerce.

Procedure in Telegraphed Complaints

When a complaint which seems to warrant investigation is received by telegraph the department immediately wires to the party complained of setting forth the facts as they have been presented and advising him that if these statements are correct he has violated the act. He is

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Complaints which are presented by mail are handled in very much the same manner except that communications are by post instead of by wire. When a complaint is received it is reviewed and, if found to come properly under the act, and if the facts presented justify action, a letter is addressed to the party complained against, setting forth in detail the allegations made and calling on him to satisfy the complaint or to furnish good and sufficient reasons for failure to do so. If the reply to this letter is unsatisfactory, and efforts to effect a settlement seem to be useless, the complainant is requested to file a formal complaint along the lines indicated in the sample furnished him, and upon receipt of this complaint the papers in the case are forwarded to the solicitor of the department for consideration, with a view to holding a hearing.

Such a hearing must be held in a city in which the party complained of is engaged in business. The Secretary's decisions are based upon the record of the evidence presented at the hearing, taking into consideration any briefs which may have been filed or any arguments which may have been made on behalf of the parties involved. These decisions review the facts in the case, discuss and decide any legal points involved, and state whether the case is to be dismissed or whether a reparation order is to be issued and, if so, the amount thereof, and fix the punishment which the Secretary feels should be inflicted.

H. A. Spilman, *Bureau of Agricultural Economics.*

PIGS Produce Pork More Efficiently on Limited Feed Levels

Do pigs which are allowed all the feed they can consume produce pork more economically than those fed on a restricted basis? It is true that full feeding or self-feeding generally produces the most rapid gains and shortens the time required for a pig to reach market weight. Results of recent feeding tests conducted at the United States Animal Husbandry Experiment Farm, Beltsville, Md., have shown, however, that decreasing the feed intake to as low as 50 per cent of a full feed resulted in an increasing efficiency in the conversion of feed into pork.

Tests Show Material Savings in Feed

In a test conducted during the fall of 1930, three lots of pigs were fed 2, 3, and 4 pounds of feed, respectively, per 100 pounds live weight, daily. The ration consisted of corn, tankage, alfalfa meal, and mineral mixture in proportions to give a nutritive ratio of approximately 1:5.5. The pigs were kept in dry lots without access to pasture and were hand-fed individually twice daily in a compartment feeder. They weighed approximately 68 pounds each at the beginning of the test and were slaughtered when they reached weights of approximately 200 pounds.

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The pigs on the 4-pound allowance required only 119 days to reach slaughter weight, but they consumed an average of 559 pounds of feed to do so. On the other hand, even though the pigs on the 2-pound allowance of feed required 166 days to reach the same weight, they consumed, on the average, only 395 pounds of feed. Thus, the restriction of the feed from 4 to 2 pounds per 100 pounds live weight resulted in a saving of over 150 pounds of feed on each pig even though additional time was required to reach market weight. The pigs on the 3-pound allowance were intermediate to the other two lots. They reached an average weight of 200 pounds in 128 days and consumed 458 pounds of feed. One hundred pounds of feed thus produced 32, 29, and 24 pounds of pork when fed at the 2, 3, and 4 pound levels, respectively. In other words, the most restricted lot produced a third more pork on an equal amount of feed but in a 40 per cent longer feeding period than the full-fed lot. No injurious or distressing effects upon the physical development of the pigs were observed even in the lowest feeding level.

Restricted Feeding Produces Lean Pork

There was also a marked difference in the leanness of the pork produced by the high and low feeding levels. The leanest pork was produced on the lowest feeding level. This was accompanied with an increased yield of the higher-priced lean cuts such as the ham and loin. In view of the growing market demand for lean rather than fat pork and the higher prices paid for the lean cuts, the pork from pigs fed on a restricted basis may yield an increased return in the meat market.

The results of these tests indicate that restricted feeding of the grain ration may be applied, with profit, to average feed-lot conditions. One of the main requirements, of course, is the use of a well-balanced, nutritious ration which supplies the materials necessary for growth rather than for fattening.

Because of the longer feeding period and possible extra work required in limited feeding, the cost of labor may offset the advantages mentioned. But especially when the feeder wishes to carry his pigs through the seasonal periods of low prices to those of increased prices the saving of feeds is likely to be great enough to warrant the extra time and labor.

N. R. Ellis *and* J. H. Zeller, *Bureau of Animal Industry.*

PINE Seedlings Show Response to Sunlight in Growth and Density

How much sunlight do young pine trees in a forest need in order to establish themselves and grow? The answer was sought in a virgin Norway pine stand on the Chippewa National Forest, Minn., which is probably typical of the primeval forest of the Lake States. (Fig. 95.) The old trees average 200 years in age and attain heights of 80 to 100 feet.

The old trees bear abundant seed at fairly regular intervals. In some places a plentiful crop of young pine seedlings has come in, while in other places the undergrowth contains no pines. If the presence or absence of pine seedlings and their growth when present were considered in relation to the amount of sunlight they receive, the nature of this relationship would answer the question about sunlight.

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N. R. Ellis *and* J. H. Zeller, *Bureau of Animal Industry.*

PINE Seedlings Show Response to Sunlight in Growth and Density

How much sunlight do young pine trees in a forest need in order to establish themselves and grow? The answer was sought in a virgin Norway pine stand on the Chippewa National Forest, Minn., which is probably typical of the primeval forest of the Lake States. (Fig. 95.) The old trees average 200 years in age and attain heights of 80 to 100 feet.

The old trees bear abundant seed at fairly regular intervals. In some places a plentiful crop of young pine seedlings has come in, while in other places the undergrowth contains no pines. If the presence or absence of pine seedlings and their growth when present were considered in relation to the amount of sunlight they receive, the nature of this relationship would answer the question about sunlight.

The question was asked the young pines themselves by measuring the light available and noting their abundance and rate of growth.

The young pines answered that both their abundance and growth are determined to a considerable degree by the amount of light they receive, and both increase with increasing light. Figure 96 shows graphically the annual height growth and abundance of young pine for different amounts of light. In light values below 5 per cent of full sunlight, pine seedlings were either absent or in such poor condition that survival was impossible. With 35 per cent light there were over 9,000 seedlings per acre, or ample numbers to restock the area completely after cutting. With increasing amounts of light the density of the seedlings continued to increase. At 93 per cent light there were over 18,000 seedlings per acre. Densities much greater than 9,000 per acre often result in overcrowding and stagnation.

FIGURE 95.—Virgin Norway pine stand with Norway pine reproduction in a small opening. The young trees are 18 years old and 4 to 5 feet high

Where young seedlings are not present in virgin Norway pine forests having 35 per cent light, or more, the timberland owner may be sure that no method of cutting the old stand is likely to bring them in.

Densest Stand Had 17 Per Cent Light

At no place in the forest was the shade of the old trees so dense as to exclude young pines. The densest pine stand had 17 per cent light and 3,500 seedlings per acre. Hazelnut, alder, and other brush species reduced the light to less than 5 per cent, in which no pine seedlings survived long.

The response of young seedlings to increased light showed that height growth in young pines receiving 30 per cent light or less is so slow that they can not outgrow the competing shrubs and young hardwoods. Trees in full sunlight were making the fastest growth. Here, however, competing vegetation is most aggressive; hence, unless the

pine seedlings have already become established and made sufficient growth to hold their own against other plants, it is easier for them to start in slight shade (50 per cent light, or more) where competitors are less vigorous. The importance of competing vegetation can scarcely be overemphasized.

Nature, when undisturbed by fire or man, provides the surest method of perpetuating the pine forests. The forester would call it selective logging by groups. It consists of enlarging gradually small openings where young pines are already established. Where no seedlings are present small openings made by cutting should be sown or planted. Surrounding trees protect the young seedlings from excessive heating and drying until they attain sufficient size to thrive in full sunlight. Enlarging the opening allows a second group of seedlings to start. If the openings are properly spaced the entire area should be reforested by the time the third cutting is completed.

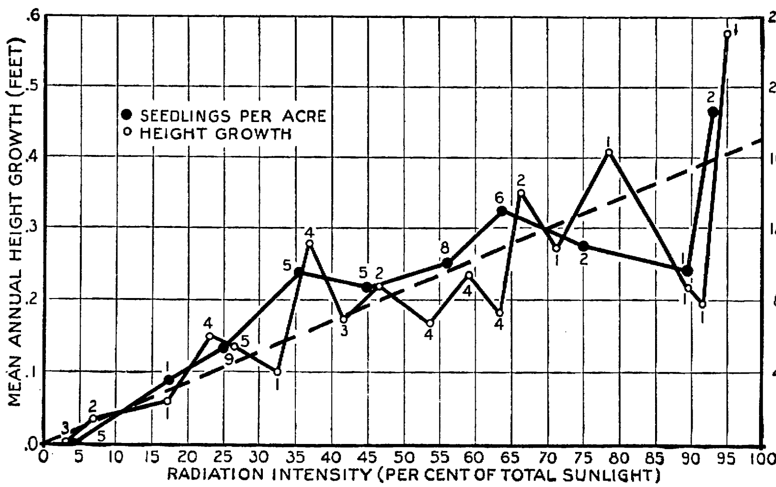

FIGURE 96.—Height growth and abundance of Norway, white, and jack pine reproduction growing in various light values in a virgin Norway pine forest

The answer to the original question, then, is that for good establishment young pines need about 35 per cent light, or about the amount present after a well-stocked, mature stand has had a light cutting. For best growth, young pines past the seedling stage need full sunlight.

HARDY L. SHIRLEY, *Forest Service.*

PLANT-DISEASE Hazards, Though Very Fluctuating, Demand Constant Action

Among the hazards that must be faced in the production of many of our major crops, one of the most poorly measured and at the present time least predictable is the loss from disease. It is well known, however, that the losses from certain diseases vary much more widely from year to year than do others. Among those that fluctuate in severity are late blight of potatoes, brown rot of peaches, and scab of apples. The estimated losses from these diseases during the decade

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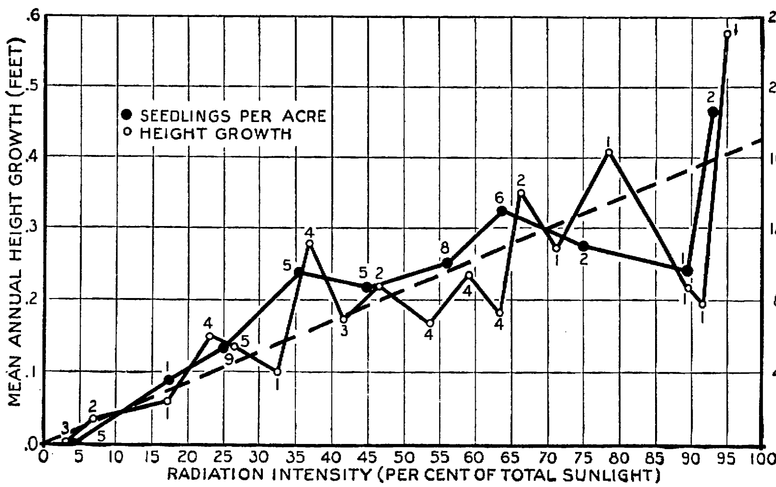

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1920–1929 are indicated in the accompanying graphs. These curves are based on estimates sent in annually to the plant disease survey of the Bureau of Plant Industry by collaborators situated throughout the United States. These losses are always expressed in percentages of crop or in terms of bushels per acre, never in dollars, because of the complex economic factors involved. In many cases, perhaps in most, the figures furnished by collaborators are estimates in the true sense of the word; that is, they are not the result of counts or calculations, but are based on general field observations. They are made, however, by careful and experienced field observers and are the most trustworthy figures available.

In making up the percentage of loss for the United States the figures for the individual States are first reduced to bushels or other units and summed to obtain the total loss for the whole country. The percentage is then computed on the assumption that 100 per cent is the total actual production plus the estimated losses from all diseases of the crop.

As shown in Figure 97, the loss from brown rot of peaches, considered on a national basis, was almost 12 per cent in 1920, fell to less then 3 per cent in 1923, and less than 2 per cent in 1925, rose again to over 10 per cent in 1928, and dropped to less than 5 per cent in 1929. Apple scab (fig. 98) showed a loss of over 12 per cent in 1922, over 9 per cent in 1924 and 1928, and less than 4 per cent in 1923, 1925, and 1926.

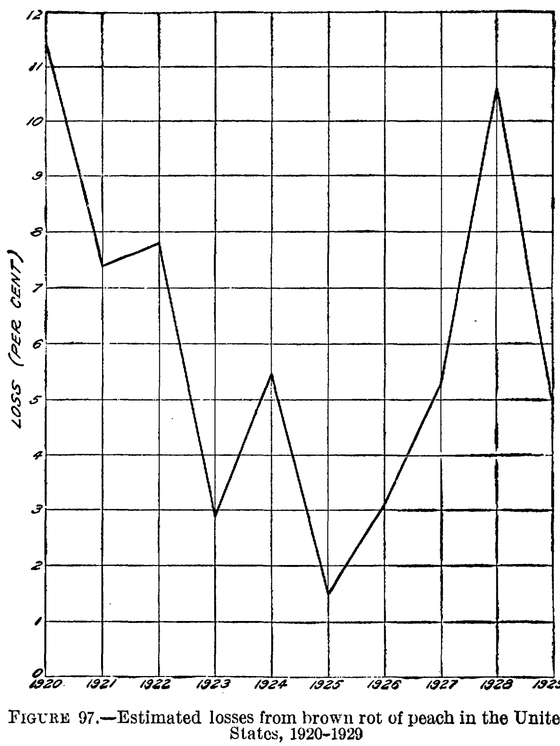

FIGURE 97.—Estimated losses from brown rot of peach in the United States, 1920–1929

Fluctuation in Loss From Late Blight

To an observer in the United States for the first time in 1923, late blight of potato might have appeared to be a minor disease, for the estimated loss that year was less than 0.2 per cent. (Fig. 99.) In 1921 and 1929 the loss from this disease was estimated at less than 1 per cent. In 1920, on the other hand, the estimated loss from this disease alone was 8 per cent of the total crop, and in 1926 and 1928 it reached approximately 7 and 6 per cent, respectively.

All the causes of loss thus far discussed are well-recognized diseases, caused in each case by a single organism. Sometimes, however, as in

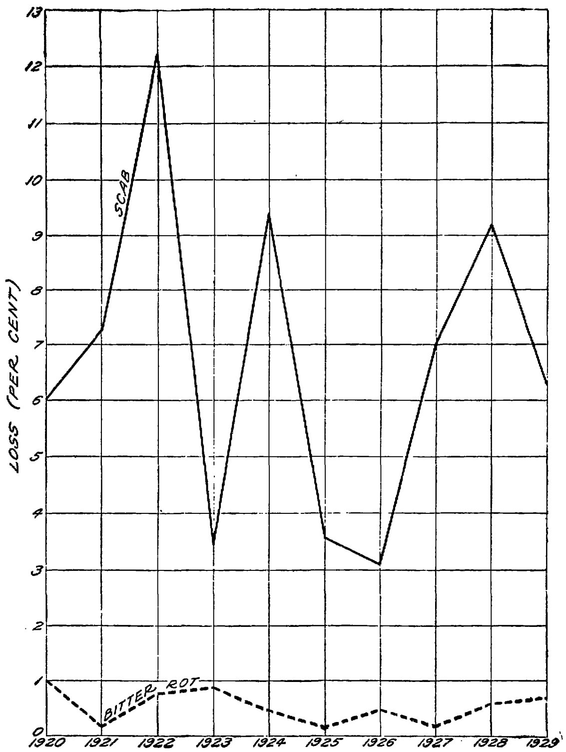

FIGURE 98.—Estimated losses from scab and bitter rot of apple in the United States, 1920–1929

storage rots, it is not easy to separate the amount of loss due to each fungus without special study, and for purposes of estimate they are therefore grouped together. Such a group, however, may show decided variation as a whole. This is the case with storage rots of sweetpotato, which have been made the subject of much careful study. (Fig. 100.) From a maximum of 23 per cent in 1920, the estimated loss from these diseases fell steadily to less than 10 per cent in 1923, 1924, and 1925, since which time it has risen somewhat, reaching almost 15 per cent in 1928.

Of course not all the diseases of apples, potatoes, or peaches fluctuate in the same way as do those mentioned. Some, such as bitter rot of apples and blackleg of potatoes, when considered on a national basis, remain a continual and comparatively steady drain on the production of the crop. (Figs. 98 and 99.)

Although these losses are expressed in terms of percentage loss for the entire United States, the loss from any disease is of course far from falling equally on all producing sections. In the United States the region of greatest severity of potato late blight includes the New England States, New York, and Pennsylvania. Apple scab is more severe in the northern than in the

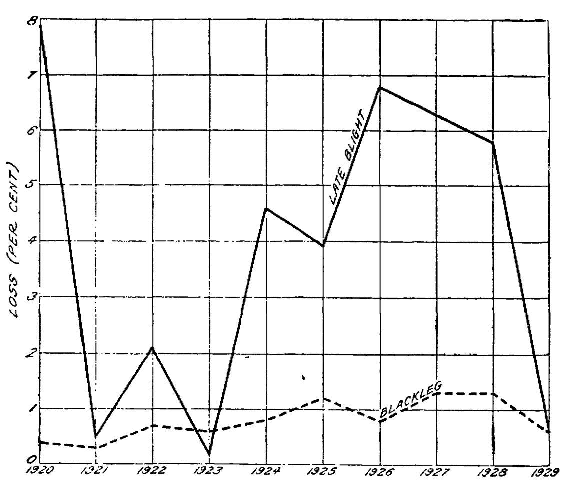

FIGURE 99.—Estimated losses from late blight and blackleg of potato in the United States, 1920–1929

southern part of the United States, while brown rot is especially severe in the peach-growing districts of the Atlantic coast from New Jersey southward.

Some Controlling Factors Known

Some of the factors that influence the prevalence of plant diseases are well known. Unusual abundance of potato late blight, peach brown rot, and apple scab is closely associated with timely or abundant rainfall. On the other hand, the fluctuation in the amount of loss from storage rots of sweetpotatoes seems more probably to be due to increase and decrease in the care with which control measures are carried out.

It is obvious that there are occasional seasons when the incidence of certain common diseases is so slight there is little advantage in control practices. A succession of such seasons often tends to carelessness and a general relaxing in control measures, with the result that losses from disease are even greater when the next bad year arrives. If disease-free years could be accurately predicted it might be possible to save money by omitting sprays in those years. Such predictions, however, must be far in the future, even if they are ever possible, and at present the only safe rule is "to keep everlastingly at it."

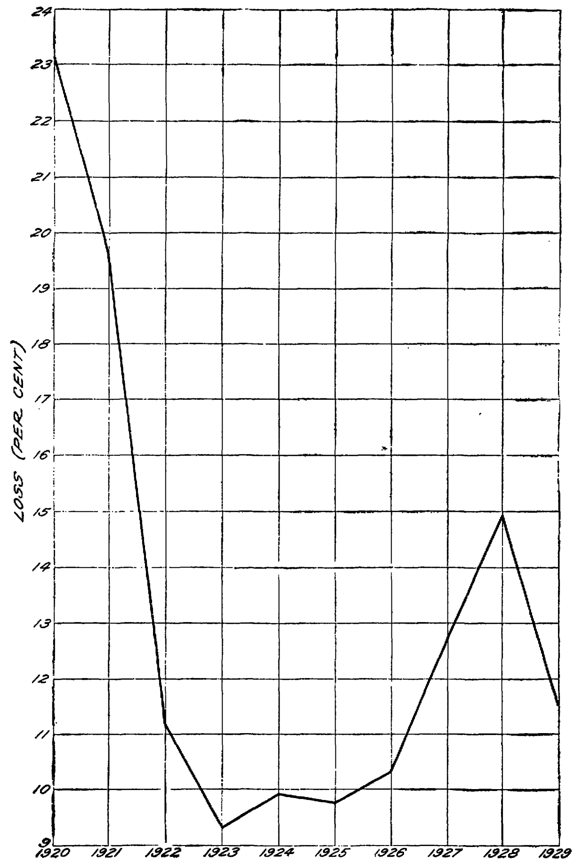

FIGURE 100.—Estimated losses from storage rots of sweetpotato in the United States, 1920–1929

NEIL E. STEVENS, *Bureau of Plant Industry.*

PLANT Explorers Bring Valuable New Species and Varieties to U. S. Keeping step with America's changing and expanding agriculture, recent exploration activities of the Department of Agriculture have brought back many diverse plant contributions from widely separated parts of the globe. Agricultural exploration has two objectives: (1) The intro-

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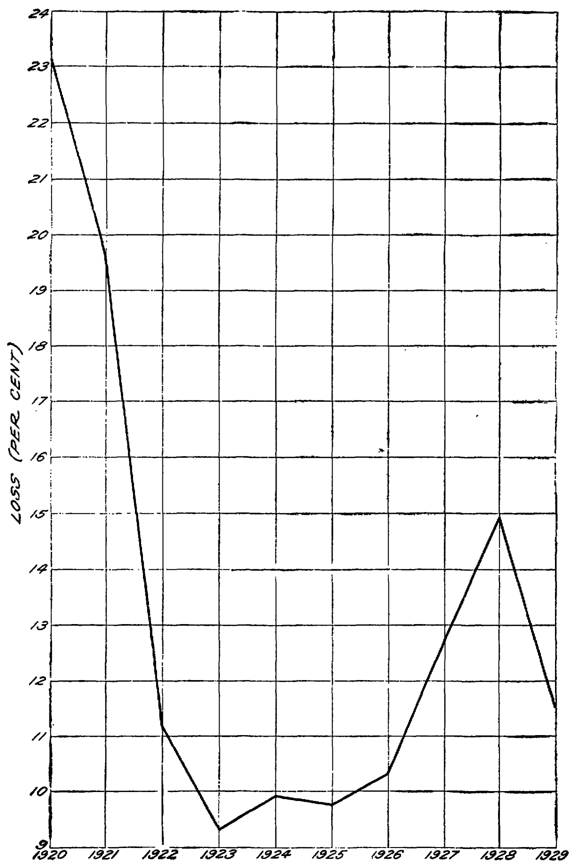

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duction of new and noncompetitive crops, both orchard and field, as an aid to the diversification of American agriculture; and (2) the introduction of varieties of crops and trees already grown in the United States which may be more resistant to disease and insect pests or to climatic extremes, thereby increasing unit yields per acre and reducing costs of production.

Extensive Exploration for Soybean Varieties

The soybean is a crop whose commercial development in the United States has been a phenomenon of the last 15 to 20 years. The success of this introduced legume throughout a wide area in the Middle West has led to a demand for varieties suited to other parts of the country.

In the spring of 1931 P. H. Dorsett, of the Division of Foreign Plant Introduction, and W. J. Morse, of the Division of Forage Crops and Diseases, returned from the Orient after a search of more than two years for new varieties of soybeans. Their travels took them to Japan, including Hokkaido, the northernmost island, and the peninsula of Saghalin, to Manchuria, Chosen (Korea), and China. Almost 3,000 soybean varieties were obtained in these great soy-producing areas.

FIGURE 101.—Methods of transporting the oriental persimmon were investigated by the Dorsett-Morse expedition

Special attention was also paid to other legumes of possible value to American agriculture, and important collections of mung beans, lespedeza, alfalfas, and Melilotus varieties were made. Other valuable field-crop introductions resulting from this expedition include collections of barleys, wheats, and grasses.

A number of valuable horticultural contributions were also obtained. A special study was made of the oriental persimmon and about 200 introductions were made from Japan, China, and Chosen. (Fig. 101.) In Peiping the expedition discovered the fruit being processed on a large scale to remove astringency, and made a thorough study of the methods used. Investigations of the outdoor storage of this fruit, begun during a previous expedition, were continued.

Numerous berries and Prunus species were included in the fruit collections made. New varieties of the oriental flowering cherry, rhododendrons, azaleas, lilies, and many other ornamental and flowering plants were procured. Different types of melons and vegetables completed the horticultural introductions; these are primarily for the use of plant breeders.

Blight-Resistant Chestnut Sought in Far East

In the fall of 1930 another important expedition in the Far East was terminated. R. Kent Beattie, of the Division of Forest Pathology, returned to the United States after a period of almost three years spent

in searching for chestnuts and chestnut relatives that might be resistant to chestnut blight and be used to replace the native chestnut wiped out by this disease in the eastern United States. His search led him throughout Japan, including the comparatively little-known island of Taiwan (Formosa), the mountain ranges of Chosen, and the hill country of China, while on the return trip stops were made in southeastern Asia. His explorations resulted in procuring scions of 90 cultivated varieties of chestnut and a total of 250 bushels of seed of many other types. At the present time seedlings are being grown by foresters and experiment station workers from Louisiana to Michigan west of the Alleghenies, and from Alabama to Connecticut on the Atlantic seaboard.

The areas covered in the search for chestnut varieties were also rich in rhododendron and azalea species and varieties, and seed of many of these was also obtained. Some of the seedlings are already being used for hybridizing by department workers for the development of improved types for American gardens.

Blight-Resistant Alfalfas and New Fruits from Asia

The spread of bacterial blight of alfalfa has taken heavy annual toll throughout the United States, particularly in the Middle West. It has made the development of blight-resistant strains imperative if this crop is to continue to be profitable in many sections. A study of old alfalfa plantings indicated that some types, grown from seed originally coming from Turkestan, were apparently immune. Accordingly, in 1929 H. L. Westover, of the Division of Forage Crops and Diseases, went to Russian Turkestan and neighboring parts of eastern Europe to hunt for resistant alfalfa types. (Fig. 102.) Because of the opportunities for procuring new varieties of fruits, nuts, and melons from this relatively isolated part of the world, W. E. Whitehouse, of the Division of Foreign Plant Introduction, accompanied Mr. Westover and later continued on into Persia. The scattered and hardly accessible alfalfa-growing districts of the Turkestan deserts and mountain regions yielded many types of alfalfa together with other legumes, cereals, and grasses. These are now under trial by department specialists.

FIGURE 102.—The Westover-Whitehouse expedition seeking alfalfas and fruits in the mountainous region of southern Turkestan

A number of interesting introductions of importance from a horticultural point of view were made. Melon collections were obtained in both Turkestan and Persia and are being used in the selection and breeding of disease-resistant strains in the United States. Collections of wild apricots, pears, apples, and the pistache nut were made in the mountainous regions of Turkestan near the Chinese frontier. The principal pistache-growing areas in Persia were visited and seed and scions of the best types were collected. Several hundred seedlings of

the best Persian varieties of this nut are now being grown as a basis of selection for large-fruited types for the Southwest. This expedition returned in December, 1929.

Disease-Resistant Wheat and Barley Varieties

In the early years of the present century Russia yielded the hard or durum wheats that have become such an important factor in our great wheat-growing States. Varieties of other cereals—barley, oats, and rye—introduced about the same time, have also contributed extensively to our national farm returns. After many years, attention has again been turned to Russia in connection with cereal problems. The annual losses sustained in the United States through cereal diseases are tremendous. The material reduction of these losses would greatly decrease our cost of production and permit more successful competition in world markets. To study cereal diseases in the great grain-growing areas of Russia and, if possible, to locate varieties of wheat and barley more resistant to disease than those we now have, James G. Dickson, cereal pathologist of the University of Wisconsin and agent of the United States Department of Agriculture, was sent to Russia in 1930. His travels took him from Moscow to Transcaucasia, formerly Armenia, and from the eastern to the western frontier of European Russia. New strains were studied in the field and at the numerous large experiment stations where thousands of varieties are now under trial. Wild types were sought in the mountainous region of the Caucasus. From all these sources many promising strains and varieties were collected.

Alfalfa and Fruit Varieties

Resuming the search for blight-resistant alfalfa, begun in the summer of 1930, H. L. Westover undertook to explore Spain and north African countries for alfalfa and other forage crops, while K. A. Ryerson of the Division of Foreign Plant Introduction sought citrus and deciduous fruit varieties and other shrubs and trees valuable to American horticulture. Together they crossed north Africa from Morocco to Tunis and return, visiting desert oases and Berber settlements in the Atlas Mountains (fig. 103) and securing seed of indigenous types of both forage crops and fruits of promise. In Spain Mr. Westover spent three months visiting all the important alfalfa-growing areas and in addition hunted wild types in the Pyrenees and in the Sierra Nevada of Granada. As a result, over 300 alfalfa introductions were obtained, together with numerous other legumes and grasses.

Earlier in 1930, in cooperation with the University of California, F. T. Bioletti, grape specialist, was sent as an explorer to Morocco, Algeria, and Tunis to study and collect indigenous types of grapes, especially those that would mature earlier than the kinds now grown in this country and would be superior for table use. Such grapes would be of special value in the irrigated desert areas of the Southwest. He also investigated and collected indigenous varieties of the apricot. As a result of this expedition, important collections of grapes were obtained and are now under trial at State and Federal stations in California, and a large number of native apricot seedlings are being grown for selection studies.

During the winter of 1929–30 H. S. Fawcett, pathologist of the California Citrus Experiment Station, was engaged in studies of citrus

and date diseases of the Mediterranean region in cooperation with the United States Department of Agriculture. As a part of these investigations, citrus varieties not now grown in the United States were selected in the different countries and sent back for rootstock studies and breeding investigations.

Survey in Islands of the Mediterranean

In addition to the extensive explorations carried on in the western Mediterranean during the summer of 1930, a short survey of the eastern Mediterranean area, particularly the islands of the Aegean, was made by David Fairchild of the Division of Foreign Plant Introduction. With the facilities of the steamer *Utowana*, which had already served several department expeditions through the courtesy of Allison V. Armour, collaborator of the Division of Foreign Plant Introduction,

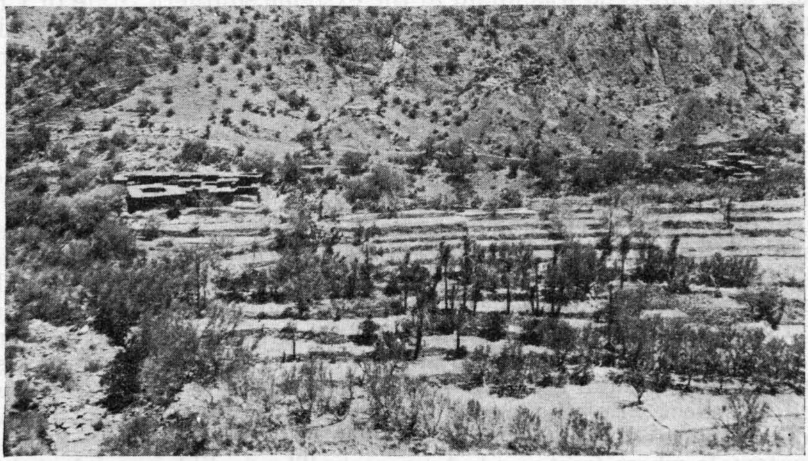

FIGURE 103.—Berber villages in the Atlas Mountains of northern Africa, where alfalfa varieties were sought

many of the islands off the regular steamer routes were visited and studied from the point of view of possible future intensive exploration for valuable plants. The route, which included the Dalmatian coast, extended as far east as Istanbul and yielded much valuable data on relatively little-frequented areas and a number of promising plant introductions.

Latin America a Fertile Field

In common with the alfalfa and cereal industries, the potato industry has been widely affected by the spread of serious diseases of fungus as well as virus origin. Breeding investigations have been under way at State and Federal stations for the development of resistant varieties. To further these activities, wild types of the potato from their habitats in Central America and South America have been found necessary. To meet this need Paul Russell and Max Souviron of the Division of Foreign Plant Introduction were sent to Mexico in the summer of 1930. In the fall Donald Reddick of Cornell University and C. O. Erlanson of the Division of Foreign Plant Introduction followed. The work continued until the beginning of 1931 and was centered in the States of

Mexico, Puebla, Morelos, Hidalgo, Queretaro, Oaxaca, and Vera Cruz. Seventy lots of tuber-bearing Solanums of several species were found and seed and tubers brought back for propagation and distribution to potato breeders in State and Federal stations. It is planned to continue similar studies in South America until all desirable wild species have been made available.

A Promising Fiber Plant for Porto Rico

Limited tests of the Mexican pochote tree (*Ceiba acuminata*) in Porto Rico have indicated that it might be a source of valuable fiber if trees yielding good crops of high-quality fiber could be introduced. On the completion of the potato activities in Mexico, early in 1931 Souviron and Erlanson explored the States of Sonora, Sinaloa, Jalisco, and Chiapas, and collected quantities of seed from the best trees. A quite different type was found in the extreme southern State of Chiapas. Excellent germination has been obtained in Porto Rico, and a sufficient quantity of seedlings has resulted from the planting to give a thorough test of the tree as a source of valuable fiber.

Primitive Relatives of Cotton and Corn Discovered

Certain of the primitive relatives of cotton and corn have long been desired by department investigators in connection with the improvement of these crops through breeding. These species are not easily accessible, their habitat being along the isolated coastal regions of Mexico and Central America remote from centers of civilization. Through the generous offer of Allison V. Armour, it was possible for G. N. Collins and J. H. Kempton of the Division of Genetics and Biophysics, and T. H. Kearney of the Division of Egyptian Cotton Breeding, to visit this coastal region in the early part of 1931 on the steamship *Utowana* and to collect all of the special species desired. In addition, Doctor Collins collected a quantity of avocado seed from a high region of Guatemala where frost regularly occurs. These will be used for selection studies in an effort to develop hardier varieties of this fruit than are now available.

Ornamental and Flowering Plants

The field of ornamental trees and shrubs and flowering plants is probably the most rapidly developing branch of American horticulture at the present time. The American people are going in for home gardening in a manner unheard of a few years ago. As a result, the demand for new and interesting ornamentals has become very strong. In order to profit by recent developments in this field in Europe and to secure some of the results of explorations for this type of plant material by European explorers, B. Y. Morrison of the Division of Foreign Plant Introduction spent several months during the spring and summer of 1931 in European countries. The new developments of plant breeders were studied, as well as the new introductions from explorations and the private and public collections of rare plants. From the best of these, selections were made for introduction and use in the United States.

KNOWLES A. RYERSON, *Bureau of Plant Industry.*

PORK Loins, When Seared, Shrink More in Weight Though Cooking Faster

"Sear the roast in a hot oven" is old-time, cook-book advice founded on the belief that searing decreased the cooking losses. The truth of this statement has wanted proof and has, in fact, been contradicted in recent work on beef, done by the United States Department of Agriculture and the Missouri Agricultural Experiment Station, participants in the national project—cooperative meat investigations. In order to determine what effect searing would produce on pork, a short study was made in which eight pairs of pork loins were roasted, one member of each with searing and one without. The cut included eight vertebræ from near the center of the loin.

The thickness of the fat layer covering the loins varied considerably owing to lack of uniformity in their trimming. To compensate for effects associated with this difference in fat layer, the loins were so divided as to balance the seared and unseared groups in this respect. Also to counteract possible differences in the two sides of the animals, each group included four right and four left loins.

In measured quantities, 1 teaspoon flour, one-half teaspoon salt, and one-eighth teaspoon pepper were rubbed into each roast. A roast-meat thermometer was inserted in the loin end of the roast, which was the thickest part. The uncooked roasts and their containers were then weighed. One loin of each of these eight pairs was cooked in an open pan at a constant oven temperature of 320° F. (160° C.), until the meat thermometer registered 183° F. (84° C.) as the internal temperature of the roast. The corresponding loin of each pair was seared for 30 minutes at an oven temperature of 482° F. (250° C.), weighed, and then cooked in an open pan at an oven temperature of 320° F. until the meat thermometer registered 183° F. All the roasts were weighed at the end of the cooking period, as were also the drippings which had collected in the pans. The total loss of weight in the oven (the difference in weight between the raw and the finished sample) was divided into two parts: (1) Loss of volatile constituents (mostly water) by evaporation, and (2) loss of nonvolatile constituents, or drippings. The drippings consisted of fat and an unanalyzed brown essence, but the drippings are treated here as a whole.

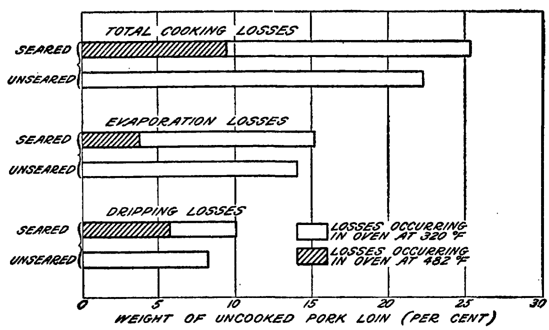

FIGURE 104.—Cooking losses of seared compared with unseared pork loins

Method of Reckoning Cooking Losses

Total cooking losses, evaporation losses, and dripping losses for the searing periods, as well as for the entire cooking periods, were calculated as percentages of the raw weights of the roasts. Each of these factors was then averaged for both the seared and the unseared groups.

The average cooking losses for corresponding seared and unseared roasts are shown in Figure 104. The portion of the losses occurring in the searing oven is indicated by crosshatching (shading) on the bars representing the total cooking losses, the evaporation, and the drippings. The seared roasts lost relatively more in evaporation and drippings and consequently in total cooking than the unseared roasts.

As would be expected, the roasts that were seared cooked more quickly than those cooked throughout at the constant temperature used. The former took 29 minutes to the pound on the average as compared with 34 minutes to the pound for the corresponding unseared loins.

The general appearance of the roasts which had been seared was somewhat better than that of the unseared roasts, the color being a richer brown, but in some cases the drippings from the seared loins were rather dark for gravy of good color.

These results suggest that searing pork-loin roasts by the method used here improves the general appearance and saves time in cooking but does not decrease the cooking losses. In fact, the cooking losses are increased with searing. This increase appears to be due mainly to the rendering out of more fat into the drippings. These results indicate that pork loin can be successfully roasted, without searing, at a constant, moderate, oven temperature of from 320° to 350° F.

Nancy Griswold Clark, *Bureau of Animal Industry.*

POTATO Seed Quality Improved by Tuber-Index Method of Selection

The improvement of the quality of seed potatoes through selective methods has long engaged the attention of the investigator as well as that of the progressive potato grower. As a natural result of such study, various methods have been evolved having for their object the selection of strains producing tubers of greater uniformity in size and shape and at the same time of greater yielding capacity. The successive steps in this evolution have been as follows:

(1) Mass selection of tubers either from the bin or from individually selected plants harvested separately and then thrown together and planted in a seed plot. (2) Hill selection, consisting of the selection of superior looking plants, followed by a second selection, when the plants are harvested, based on yield and uniformity of tubers. The tubers from each selected plant are kept separate and planted in progeny rows. (3) The tuber-unit method, by which each individual tuber from either mass selection or hill selection is cut into four parts, which are planted consecutively in the row.

These methods had as their primary object the isolation of promising strains of seed. In most cases, however, they accomplished another object oftentimes not premeditated by the investigator, namely, elimination of disease.

With the increasing importance of virus diseases as an obstacle to the production of certified seed potatoes, a more certain means of eliminating tuber-borne diseases has become necessary, and as a result the tuber-index method[2] has been evolved. Briefly stated, this method consists in removing and growing a seed piece from each individually numbered tuber selected from some given stock from which it

[2] The tuber-index method was first employed by F. M. Blodgett and associates of Cornell University, Ithaca, N. Y., during the season of 1919 and also during the winter of 1919–20.

The average cooking losses for corresponding seared and unseared roasts are shown in Figure 104. The portion of the losses occurring in the searing oven is indicated by crosshatching (shading) on the bars representing the total cooking losses, the evaporation, and the drippings. The seared roasts lost relatively more in evaporation and drippings and consequently in total cooking than the unseared roasts.

As would be expected, the roasts that were seared cooked more quickly than those cooked throughout at the constant temperature used. The former took 29 minutes to the pound on the average as compared with 34 minutes to the pound for the corresponding unseared loins.

The general appearance of the roasts which had been seared was somewhat better than that of the unseared roasts, the color being a richer brown, but in some cases the drippings from the seared loins were rather dark for gravy of good color.

These results suggest that searing pork-loin roasts by the method used here improves the general appearance and saves time in cooking but does not decrease the cooking losses. In fact, the cooking losses are increased with searing. This increase appears to be due mainly to the rendering out of more fat into the drippings. These results indicate that pork loin can be successfully roasted, without searing, at a constant, moderate, oven temperature of from 320° to 350° F.

NANCY GRISWOLD CLARK, *Bureau of Animal Industry.*

POTATO Seed Quality Improved by Tuber-Index Method of Selection

The improvement of the quality of seed potatoes through selective methods has long engaged the attention of the investigator as well as that of the progressive potato grower. As a natural result of such study, various methods have been evolved having for their object the selection of strains producing tubers of greater uniformity in size and shape and at the same time of greater yielding capacity. The successive steps in this evolution have been as follows:

(1) Mass selection of tubers either from the bin or from individually selected plants harvested separately and then thrown together and planted in a seed plot. (2) Hill selection, consisting of the selection of superior looking plants, followed by a second selection, when the plants are harvested, based on yield and uniformity of tubers. The tubers from each selected plant are kept separate and planted in progeny rows. (3) The tuber-unit method, by which each individual tuber from either mass selection or hill selection is cut into four parts, which are planted consecutively in the row.

These methods had as their primary object the isolation of promising strains of seed. In most cases, however, they accomplished another object oftentimes not premeditated by the investigator, namely, elimination of disease.

With the increasing importance of virus diseases as an obstacle to the production of certified seed potatoes, a more certain means of eliminating tuber-borne diseases has become necessary, and as a result the tuber-index method[2] has been evolved. Briefly stated, this method consists in removing and growing a seed piece from each individually numbered tuber selected from some given stock from which it

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is desired to eliminate as far as possible all tuber-borne diseases, especially those of a virus nature. (Fig. 105.) During the early stages of their growth the plants produced from these individual seed pieces are carefully observed for the presence of mosaic and other virus diseases. As each plant carries the number of the tuber from which the seed piece was removed, it is easy to discard the diseased tuber. All tubers from which the tested seed piece produced a healthy plant are used in the planting of a well-isolated seed plot. Usually they are planted on the tuber-unit basis in order to make it easier to detect the presence of any diseased ones that may have escaped observation in the preliminary test.

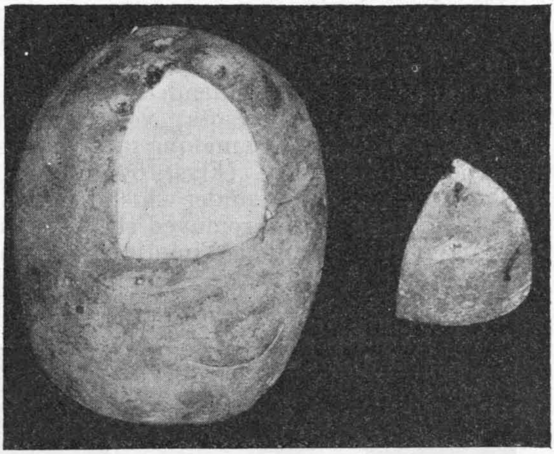

FIGURE 105.—Method of removing seed piece from potato tuber to determine presence or absence of disease. The small seed piece is either potted or planted out and grown for observation

Two Ways of Applying the Method

It is possible to take advantage of this method of tuber-disease detection under two distinct conditions. The first is that of potting the seed pieces into 4 or 5 inch pots and growing them in the greenhouse. By this practice it is possible to carry through several sets of plants in the same bench space during the winter months. Growers following this practice and utilizing their greenhouse space to the best possible advantage are resorting to chemical treatment of the seed pieces to hasten germination. In this way it is possible to begin tuber-index studies shortly after the tubers are harvested.

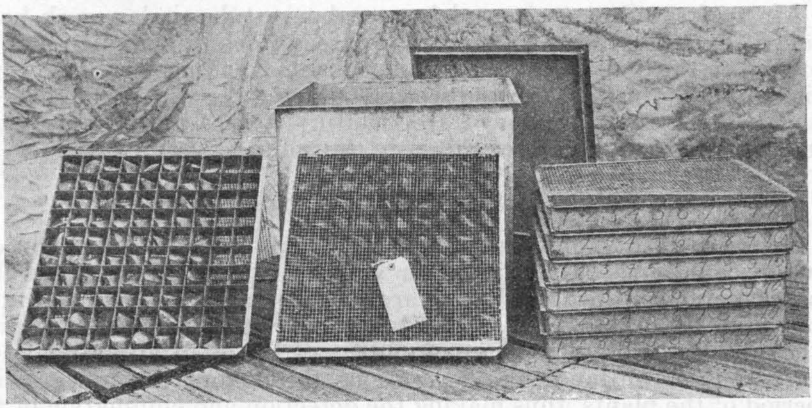

FIGURE 106.—Method of germinating successive lots of potato seed pieces in trays. This method increases the capacity when greenhouse space is limited. The seed pieces are covered with sand or soil. (Photograph furnished by H. O. Werner, Nebraska Agricultural Experiment Station)

Tuber indexing seed-potato stocks in advance of date of planting has now become a precertification requirement in some States. Where such conditions are imposed on the would-be grower of certified seed he is obliged to submit a representative sample of his seed stock for indexing by those in charge of the certification work. If the test shows the presence of too large a percentage of disease he is advised to discard it and purchase some recommended stock.

The Wisconsin, Minnesota, Nebraska, and Montana Agricultural Experiment Stations are making most extensive use of the greenhouse for tuber-index studies. (Figs. 106 and 107.)

The second condition under which tuber indexing may be conducted is that of planting the removed seed pieces in the open field. Such indexing may be conducted in all regions where first and second early potato crops can be grown; roughly speaking, from southern New Jersey to Florida and southwest to the Pacific coast.

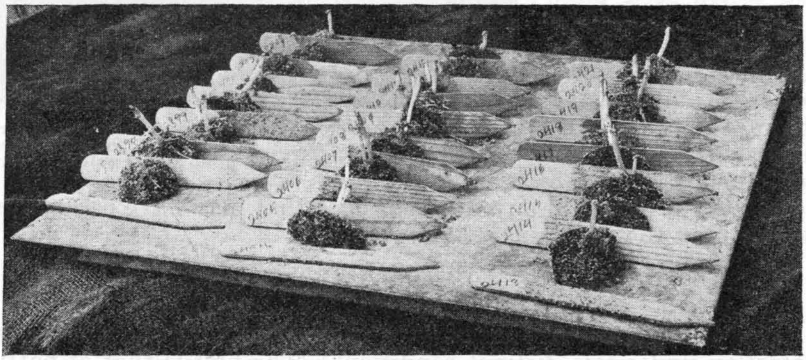

FIGURE 107.—Germinated potato seed pieces removed from trays prior to being potted or planted in benches. (Photograph furnished by H. O. Werner, Nebraska Agricultural Experiment Station)

Most of the States engaged in greenhouse tuber-index work have taken advantage of the field-indexing of seed stock by shipping samples of seed to the South and making their disease readings at some propitious time during the growing season. During the winters of 1929–30 and 1930–31 the Division of Horticultural Crops and Diseases has indexed many thousands of tubers in the South.

Readings Dependent on Climatic Conditions

Satisfactory outdoor disease readings are largely dependent on climatic conditions. If the weather and soil conditions are favorable much more accurate observations are possible than if reverse conditions prevail. Field indexing has an advantage over greenhouse studies in that it is possible to test large numbers of tubers at a relatively low cost and to continue the observations throughout the full growing period of the plants, thus making the detection and elimination of the spindle-tuber disease more certain.

Until varieties resistant or immune to virus diseases have been developed, the tuber-index method offers the most reliable known means of eliminating tuber-borne diseases.

WILLIAM STUART, *Bureau of Plant Industry.*

POULTRY Experiments Show Value of Alfalfa Meals in Chick Ration The number of poultry in the United States has increased greatly in the last decade, and with the increase have come many new problems in management. Formerly, most poultry were kept as a sideline on general farms and usually compelled to forage for feed. Under the free-range conditions generally used, sufficient green feed was available except during the winter.

An entirely different situation exists to-day. Numerous farms are devoted entirely to poultry keeping, and the tendency is to confine the birds to limited areas. When a bare range is provided, or when battery brooding or the confinement method of management is used, it is usually advantageous to supply fresh green feed or a green-feed substitute.

In view of the recognized importance of vitamins in nutrition, much emphasis has been placed on the vitamin content of feedstuffs. The necessity for some source of vitamin A in a ration for chicks is illus-

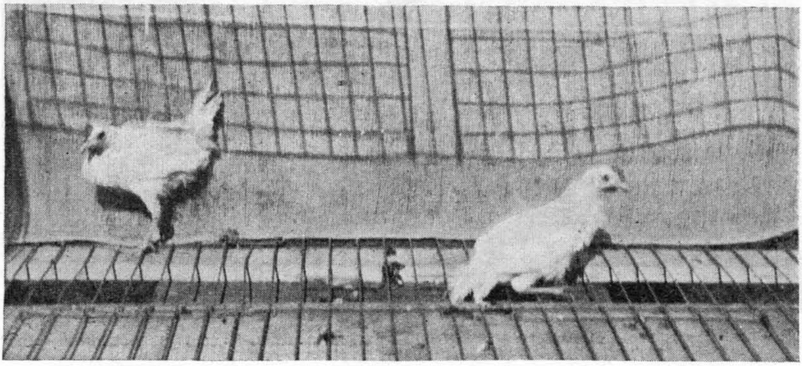

FIGURE 108.—Chickens 20 weeks old which had received a ration deficient in vitamin A

trated in the accompanying photographs taken at the United States Poultry Experiment Station, Glendale, Ariz. The chickens were all 20 weeks old when the photographs were taken. The two chickens in Figure 108 were the survivors of a group of 38 which had been fed a basal ration deficient in vitamin A. In Figure 109 are shown 5 chickens from a group which had been fed the same deficient basal ration, plus fresh alfalfa. The mortality in this group receiving fresh alfalfa was slight and, as illustrated, the growth of these chickens was much greater than that of the group which received only the basal ration.

Kinds of Alfalfa Meals

When poultry are raised under intensive conditions it is often not possible to furnish them with fresh green feed, even during the summer. The inclusion, in the mash, of meals made from the alfalfa plant is becoming popular and several investigators have demonstrated that meals made from the fresh entire alfalfa plant, alfalfa leaves, and alfalfa hay can be used advantageously in rations for laying hens. Few trials have been conducted in which those products were compared in the rations of young chickens.

Meals made from alfalfa are commonly recommended as a part of poultry rations, but usually not enough emphasis has been placed upon the differences which may exist among different meals. Rain damage and improper curing are often indicated by a loss of green coloring matter. Meals which have been damaged in such ways usually are yellowish in color. The age of a meal also is often indicated by its color, since the green coloring matter changes to a yellowish green as the meal becomes older. In general, two kinds of meal are made from alfalfa. One, called alfalfa meal, is made from the entire harvested plant; the other, called alfalfa-leaf meal or alfalfa leaf and blossom meal, contains more leaves and fewer stems. Alfalfa meals have lower protein and higher fiber contents than the alfalfa-leaf meals or the alfalfa leaf and blossom meals.

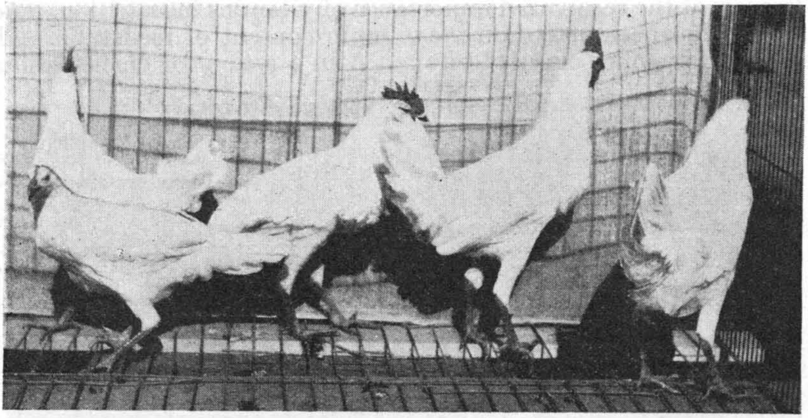

FIGURE 109.—Chickens 20 weeks old which had received a ration deficient in vitamin A, plus fresh alfalfa

A series of experiments was conducted at the United States Poultry Experiment Station to compare alfalfa meal, alfalfa-leaf meal, and fresh alfalfa as sources of vitamin A in a ration for chicks. The basal ration used was deficient in vitamin A, and measured amounts of the different supplements were used for different groups. In the trials, fresh alfalfa was found to be superior to either alfalfa meal or alfalfa-leaf meal when used as the sole source of vitamin A.

Inasmuch as it is often not possible or practicable to feed fresh alfalfa to growing chicks, the most applicable comparisons were those between the groups receiving alfalfa-leaf meal and the groups receiving alfalfa meal. Growth and livability of the chicks were the bases for comparisons, and the alfalfa-leaf meal gave much better results than the alfalfa meal. In fact, the alfalfa meal was practically valueless with the basal ration used.

Suggested Quantities in Rations

In accordance with the results obtained, it can be recommended that fresh alfalfa be fed to chicks whenever it is available, and that alfalfa-leaf meal, preferably with a rich green color, be used as a source of vitamin A when fresh alfalfa can not be obtained.

How much alfalfa-leaf meal should be used in a ration for chicks? The proper quantity will vary in proportion to the quantity of other sources of vitamin A in the ration. When other good vitamin A sources, such as yellow corn, are used freely, as little as 2.5 per cent may be used. In other rations, from 5 to 7.5 per cent of the mash ration should be alfalfa-leaf meal. In rations in which alfalfa-leaf meal is the only source of vitamin A, this meal should constitute about 10 per cent of the total food intake.

The manufacture of dehydrated alfalfa meals is becoming more extensive. Briefly, the methods used consist in removing the moisture from fresh alfalfa soon after it is cut. Thus far, it has not been demonstrated that dehydrated meals are of more value in poultry rations than meals made from sun-cured alfalfa hay in sections where rain does not interfere with curing. Further experimental data must be obtained before any definite statements about the value of dehydrated alfalfa meals in poultry feeding can be made.

BURT W. HEYWANG, *Bureau of Animal Industry.*

POULTRY Lice Cause Heavy Losses Which Are Wholly Preventable

That poultry lice curtail production and profits is generally admitted. The extent of loss naturally depends on the degree of infestation. Probably a few lice do little harm to mature poultry, but a few lice may soon become many lice, and young birds are more susceptible to louse attack than are mature ones. Some experiments carried out by the Bureau of Entomology a few years ago indicate that a moderately heavy infestation may cut egg production 15 per cent. That means a loss of millions of dollars to the poultry owners of this country. This loss is wholly preventable, and at low cost.

Many progressive commercial poultry raisers eliminate lice from their flocks or hold them under control. The owners of farm and back-yard flocks, however, usually pay little attention to these parasites, but continue to feed thousands of them year in and year out.

There are five different kinds of lice commonly found on chickens. These have somewhat different habits and some are more injurious than others. They have been given common names which indicate the part of the bird or its feathers, which they inhabit. The head louse is found principally on the head and neck and is the most injurious to young chicks and poultry. The body louse spends most of its life on the skin of mature chickens. It prefers places where the feathers are not too dense, such as below the vent, but on half-grown chickens it may be found in abundance on the back and neck. This louse infests turkeys and other fowls as well as chickens. It is one of the most widespread and injurious species. The shaft louse is present on different parts of the host, but is nearly always seen on the shaft of the body feathers. The wing louse is found mainly on the large wing feathers, but also occurs on the tail and neck feathers. It is less injurious than the species previously named. This is also true of the fluff louse, a slow-moving species which is usually found on the fluffy feathers of the body. Other kinds of lice are found on turkeys, geese, pigeons, and other fowls and birds.

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All Species Yield to Sodium Fluoride

Fortunately for the poultry raiser all these different kinds of lice can be destroyed by the treatment developed and recommended by the Bureau of Entomology—namely, the use of commercial sodium fluoride. This powder may be applied either as a dust or as a dip.

In using it as a dust the "pinch method" is advised. This consists simply of putting about 12 pinches of the powder, as held between the thumb and forefinger, next to the skin on different parts of each bird. The head, neck, back, breast, the part beneath the vent, the wings, and tail should each be treated.

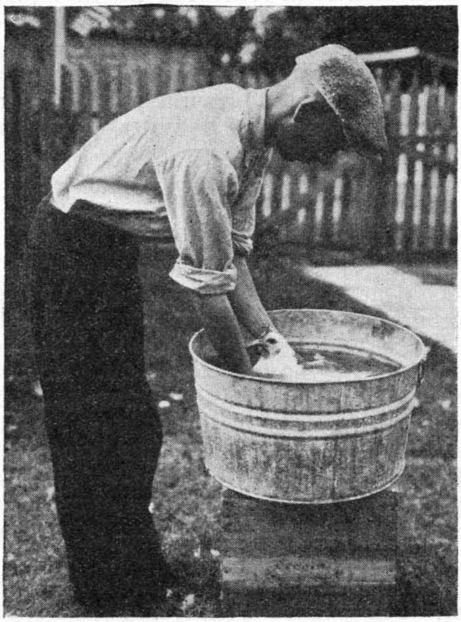

FIGURE 110.—A single dipping of a fowl in sodium fluoride solution will kill all lice

Where more than 35 fowls are involved the dipping method is advised. A bright, warm day should be chosen for the work. The sodium fluoride is dissolved in water in the proportion of a heaping tablespoonful to each gallon. A tub is well filled with this solution and each bird is immersed for a few seconds. The bird is held in the dip by the wings with one hand, while with the other the feathers are raised to allow the solution to reach the skin. The head is ducked for an instant.

By either of these methods every louse and egg is killed. Thus by a single treatment of every fowl on the premises the lice may be eradicated. (Fig. 110.) The cost for material is but a fraction of a cent per bird, as 1 pound of sodium fluoride will treat 100 hens by the pinch method and 200 by dipping.

Other materials may be used for combating poultry lice, but considering effectiveness, cost, and availability, sodium fluoride is recommended.

F. C. BISHOPP, *Bureau of Entomology.*

POULTRY Raising on a Very Intensive Scale Is Proving Practical The keeping of large numbers of chickens on one farm has developed to such an extent in this country that there are now battery brooding plants which will accommodate many thousand chicks, laying houses with quarters for several thousand hens, and poultry farms of from 10,000 to 25,000 hen capacity. Much of the intensification has developed in the last few years since the use of cod-liver oil in the ration has enabled poultry men to keep both chickens and hens confined indoors without loss of vigor or health.

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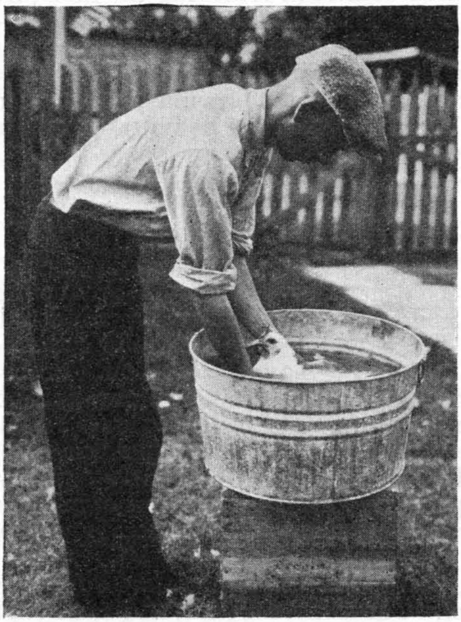

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Brooding chicks in batteries, especially for the production of broilers, is the branch of this work which has been most intensively developed in recent years. Many types and sizes of batteries are in use, from small batteries holding 200 to 300 chicks to large units holding several thousand birds. All these batteries have wire floors which prevent the chickens from eating their droppings. This feature is important especially in the prevention and control of disease. Batteries are now operated in insulated rooms where the temperature, humidity, and ventilation are all artificially controlled so that uniform conditions may be maintained regardless of changes in the weather.

Sanitary Safeguards Are Features of the System

The use of battery brooders is advised for raising broilers and for raising all chicks where the soil is infected with disease germs. They are being used successfully on many farms for starting chicks even where there is no trouble with infected soil. Turkey poults are also brooded successfully in batteries. Long brooder houses in which the chicks are raised on the floors and which have small, outside, covered yards with either concrete, gravel, or wire bottoms, are also used successfully. Keeping the chicks away from the soil and giving careful attention to sanitation are important features in these methods of brooding.

Chickens that are to be kept longer than from 12 to 14 weeks will do much better and require less care if transferred to a clean range as soon as they no longer need artificial heat. The use of a cheap, portable, range shelter, made with a very low roof and wired sides and floor, is one of the recent improvements in the raising of good pullets. Even in producing broilers many poultry men start the chicks in the batteries, transfer them to brooder-house pens when they are from 6 to 8 weeks old, and then put them in fattening batteries for two or three weeks before the broilers are marketed.

Chickens that are brooded in large numbers indoors require very careful management. Deformed and twisted legs are common defects in chicks raised in battery brooders and these defects are not prevented by the use of cod-liver oil. This department has found, however, that the use of 10 per cent of rice bran in the ration is very helpful in growing battery-brooder chicks free from leg trouble. Reducing the amount of corn meal and increasing the wheat bran in the ration have helped in some cases to prevent leg trouble and also to cause better feather growth.

Overcrowding is the cause of much loss in battery brooding, since batteries large enough for starting the chicks become greatly overcrowded after the chicks are a few weeks old. The fact that a chick triples in weight between 4 and 8 weeks of age makes it easy to understand why overcrowding is a common trouble in battery brooding. Chicks often pick one another when in these batteries, causing heavy losses in the brooder as well as poor quality in the market chickens. Keeping the brooder houses slightly dark and using ruby-colored lights in the pens have been reported as being helpful in preventing this trouble.

Multiple-Story Laying Houses

Laying houses from two to six stories in height, with a capacity of several thousand hens, have replaced the common type of long single-

story houses on a number of poultry farms. The birds are kept confined in these large houses and are never on the ground after they go into the houses as pullets in the fall. Since hens on large poultry farms are usually confined most of the year even in 1-story houses, larger houses do not involve any radical change in management. Cod-liver oil is used in the ration to insure an adequate supply of vitamin A and the sunshine vitamin, D. The windows are arranged to allow the maximum amount of sunlight to shine directly into the house. These large houses reduce labor costs, and the birds are less affected by changes in the weather than they would be in small houses. In many cases large barns (fig. 111) have been remodeled into multiple-story laying houses.

The successful management of these apartment poultry houses requires close observation since even slight neglect may result in heavy losses in the flock. The ration must contain all the essential ingredients, properly balanced, because the hens have no chance to supplement their feed with greens, minerals, or grain commonly found on range. In one of the department's experiments the use of a slightly deficient diet gave fairly good egg production with hens on range, while the same ration fed to hens confined to the house produced only a few eggs per hen.

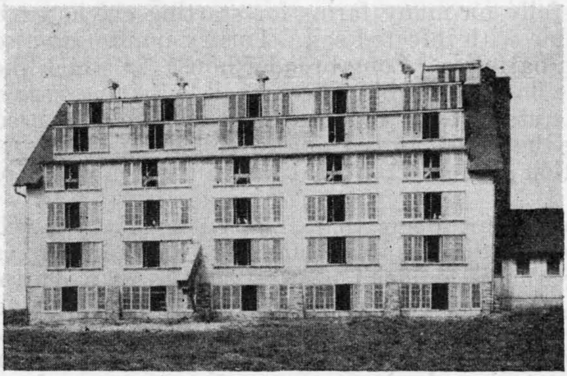

FIGURE 111.—Dairy barn remodeled into a large, 6-story poultry house

Ventilation of a large poultry house requires the use of a mechanical ventilating system. Many of the houses are insulated and heat is being provided in some. All large poultry houses must be kept absolutely clean and sanitary. These large hen houses probably will increase in number as more information is obtained on feeding the hens, on ventilating and heating the buildings, and on the control of picking which has been a cause of much loss where hens are confined.

ALFRED R. LEE, *Bureau of Animal Industry.*

PREDATORY-ANIMAL and Rodent Control to be Conducted Under a 10-year Program

After working more than 15 years in the control of predatory animals and injurious rodents on the public domain and elsewhere in cooperative undertakings, the Bureau of Biological Survey has been authorized by Congress to conduct the work on a 10-year program. The new act, approved on March 2, 1931, will permit the bureau, when funds are provided, to do more effective work along lines already organized rather than to stimulate new lines of control. The law was passed only after careful consideration and public hearings, in which expression of divergent views was given by

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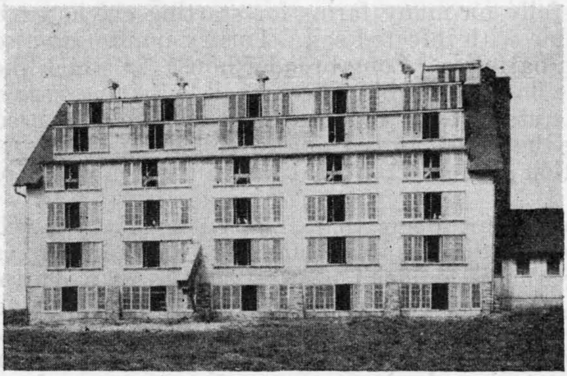

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many interested. Its passage should therefore set at rest any doubts that remain as to whether the control operations of the Biological Survey as now conducted deserve public approval.

Wolves, coyotes, mountain lions, and bobcats every year destroy large numbers of livestock and game, and the coyote at times also serves as a carrier of rabies, or hydrophobia. The economically injurious rodents, such as prairie dogs, ground squirrels, pocket gophers, jack rabbits, porcupines, rats, and field mice, not only destroy growing and stored crops, forest and other nursery stock, and much of the range grasses that should support the farming and livestock industries, but in some cases also spread such diseases of man as spotted fever (by ground squirrels), tularemia (by rabbits), and bubonic plague (by rats and ground squirrels). Control of both groups of these economic wasters of the individual farmer's efforts is necessary in the interests of agriculture, horticulture, forestry, animal husbandry, and wild game.

The settler who saw the profits of his hard work wiped out by the incursions of predatory animals into his stock ranges, and of rodents into his cultivated fields, had no recourse other than to ask aid of the Government whose lands served as breeding reservoirs from which these destroyers kept coming. Uncontrolled, they would reinfest his stocked and cultivated acres in spite of all that he could do, either single handed or with the aid of his neighbors. To effect some measure of relief, he and his neighbors resorted to the use of steel traps, rifles, poisons, and trained dogs. The appeals they later made to the Federal Government for aid in suppressing predators and rodents on the public domain led to the first cooperative Federal efforts toward control.

Many Bounty Laws Repealed

Prior to the Federal Government's entry into the cooperative control program, the desultory warfare against these animals had included the payment of bounties, a premium on the heads of the predators, to stimulate individual activity in their control. Bounty laws have continued in effect more or less to the present, though within the past 15 or 20 years many of them have been repealed, because it was found that they encouraged only sporadic efforts toward control and were productive of fraud. Since that time the steady growth of correlation of Federal, State, and local efforts has resulted in the development of more efficient control measures and, when such measures are applied, in increased safeguards for beneficial forms of wild life.

Since 1915 the leadership of the Bureau of Biological Survey in predator and rodent control has been requested and encouraged by State and other cooperating agencies, and the funds made available from such sources for expenditure under the direction of this Federal agency have in recent years been far in excess of those provided for the purpose from the National Treasury.

Research studies of the geographic distribution and relationships of the wild birds and mammals of the country, and field studies of their food and other habits, have been conducted by the Biological Survey for almost half a century, and these investigations have provided the basis of the control work carried on. Scientifically trained men are continuing research along these lines as funds permit, both in the field and in the laboratory.

The legal sanction for control work by the Federal Government is contained in congressional direction in annual appropriation acts for

the Department of Agriculture. These provide for investigations, experiments, demonstrations, and cooperation for the control of wild animals that become economically injurious, and for the suppression of rabies in predatory animals. The special program of control, which was called for by the Seventieth Congress, was authorized by the Seventy-first Congress as drawn up by the Department of Agriculture to cover a 10-year period.

Federal, State, and Local Cooperation Provided

The 10-year program contemplates continued cooperation between Federal, State, and local agencies, with a view to avoiding duplication of work and insuring the largest possible return from such funds as are provided. The Bureau of Biological Survey will continue cooperation with the Office of Cooperative Extension Work, the extension-service organizations, including colleges and county agricultural agents, and with State departments of agriculture, county commissioners, game commissions, and various agricultural, horticultural, and livestock organizations. In the work on Federal lands, the 10-year program contemplates close cooperation with the Forest Service, the Indian Service, and with other agencies, as necessity arises.

There are at present more than 16,000,000 acres of rodent-infested lands within the national forests. The greater portion of these infested lands is thickly populated with prairie dogs and ground squirrels. Experiments and observations over a long period have demonstrated that prairie dogs will destroy from 20 to 80 per cent of the succulent forage grasses about their towns. The 10-year program contemplates, in cooperation with the Forest Service, a thorough control of rodents where it has been determined that they materially lessen production on forest grazing areas.

In many of the Eastern States also rodent-control work is necessary. The additional funds to be provided under the program will permit Biological Survey leadership in organized campaigns against such rodents as cotton rats in the South, pine mice and pocket gophers, and the common brown rat, which is probably the most destructive of all animals.

Within the past several years the coyote, one of the most persistent of the larger predators, has made its appearance in New York, Alabama, Georgia, Florida, Maryland, and Tennessee. From what source it has come is a moot question.

In Alabama, the coyote was introduced by fox hunters in mistake for fox pups, according to reports. In other instances possibly the source of infestation has been tourists returning from vacation lands in the western country and bringing young coyotes with them as pets. These in turn, escaping from their owners, revert to the wild and establish themselves in their new homes. In every case where the coyote has recently made its appearance in the East and South, complaints have been registered against its depredations, particularly on calves, sheep, hogs, and poultry.

In middle Tennessee, for instance, a petition for aid, signed by 18 farmers, showed a loss of 131 lambs, 56 ewes, and 1 goat. An expert hunter was assigned to this area under a cooperative agreement with Hickman and Maury Counties, and he succeeded in eliminating the demonstrated coyote infestation that was in existence, thus alleviating the loss these farmers had been sustaining.

The 10-year program contemplates control of predators on public domain to an extent that will reduce to the minimum the infestation on adjacent livestock-grazing areas. Under present conditions, such control is not possible because of reinvasions from a constantly renewed source of supply. Much has been accomplished during the last 15 years, but the degree of control that is desired has not been attained, and reinfestations of cleared areas are constantly occurring. The authorization of the 10-year program and provision of the funds contemplated should be an aid in more adequately controlling injurious mammals.

STANLEY P. YOUNG, *Bureau of Biological Survey.*

RADIO Correlation Arranged by Federal and State Agencies Correlation of the information broadcasting of the Department of Agriculture and the State land-grant institutions, a development toward which the Radio Service has been looking for three years, became a reality during the last year and will be effective on a nation-wide scale during 1932.

Under the new system, information from the Department of Agriculture will be adapted and supplemented by the State extension services, which under the Smith-Lever Act of 1914 are operated by the land-grant colleges and universities. Thus, the information resources of the land-grant institutions and of the department will be pooled in order to bring out the most timely and useful information available, and information which will be of greatest interest to farm people in particular regions.

The plan for correlation had its inception in 1928, when the Radio Service was invited by the radio committee of the Association of Land Grant Colleges and Universities to cooperate in working out a system for correlating Federal and State broadcasting. At that time, it was proposed to correlate only the daily agricultural syndicate programs, which are sent in mimeographed form to individual stations upon request. The present plan is more inclusive. It contemplates State participation, also, in the network program of the department and in the home-economics syndicate service.

The general proposal for correlation of agricultural syndicate programs is that half of the material will be prepared by the department and half by the State extension services, to make a 15-minute, 6-days-a-week program. Naturally, the details of the proposal have been modified to meet varying conditions within States. The general proposal also contemplates that the material be supplemented by county extension agents, in order to give it the maximum local interest and adaptability. Also, that the program be presented by county extension agents whenever possible, thus providing authoritative speakers.

The home-economics syndicate service will be correlated in a similar way. The Housekeepers' Chats, which have been popular features on radio stations throughout the country for six years, will be sent to cooperating State extension services for adaptation and supplementing.

The proposal for State participation in the national farm and home hour—now broadcast over a network of 45 stations associated with the

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National Broadcasting Co.—calls for setting aside a daily 5-minute period for the use of State extension services. At the end of the year, this proposal is awaiting completion of a canvass of the States to determine their desires.

Detailed proposals have been submitted to 33 States this year, by the Directors of Extension and Information of the Department of Agriculture. The remaining 15 States are to be contacted as early as possible in 1932, so that the correlated system can be put in operation on a country-wide basis during the year.

Of the 33 States contacted, 22 are ready to handle at least one of the correlated services at the beginning of the new year. Five others have not yet definitely formulated their broadcasting plans.

The Radio Service plans to issue the first material in the new correlated agricultural syndicate service for release January 18, 1932. At least 19 States will be cooperating in the service at that time, with the possibility that seven more, now undecided, will be added to the list before the starting date.

ALAN DAILEY, *Radio Service.*

RADIO Preferences of Farmers Indicated by Sixteen Test Programs Farmers are jealous of their radio time. They demand that agricultural or informational programs be easy to listen to, and easy to understand and remember. But they want the subject matter concise and definite, concrete and specific. They resent the inclusion of anything which serves as a distraction from the information itself.

These are the main conclusions gathered from reports of farmer-listeners who gave their judgment on a series of 16 experimental broadcasts presented by the Radio Service of the Department of Agriculture in cooperation with Station WGY of Schenectady, N. Y. Further analysis of those reports, however, gives us considerable insight into what makes for easy listening and ready understanding in a radio program.

In each of the test programs, the same agricultural subject matter was given in two forms and the farmers who volunteered to listen and report were asked to choose between the two and give reasons for their preference. In each case, one of the forms was always the narrative style used by the department in its regular Farm Flashes over Station WGY, and was immediately followed by the same information prepared in another style; for example, the usual news-story style. Each test was repeated a month later but with different subject matter prepared by a different writer.

Tabulation of farmers' reports on the entire series of 16 different broadcasts covering nine different styles of presentation shows that programs prepared in the form of a news-story, as a logically outlined public speech, as a sales talk, as a talk interlarded with jokes and humorous verse, in the form of a fable, and as a narrative, were each less popular with farmer listeners than were the programs written in the form of experience reports from different farmers, those prepared in the form of simple questions and answers, those in a style requiring listener participation by the use of paper and pencil for taking notes and drawing simple charts, or those in a style in which special care was taken to state minor details in specific, concrete terms.

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The reasons given by the listening farmers for their preferences are most illuminating. Running through the whole series of reports is a chain of comments which show that one of the best ways to get and hold farmer interest is to talk to him in straightforward, sincere, informal, friendly farmer fashion, and to talk to him about what other farmers have actually done on their farms.

The real is preferred to the abstract or the fictional. And the strong preference shown for the programs containing many specific details appears to be based on the fact that such details help create the illusion of solid reality in the mind of the listener.

It also appears from these farmer votes and opinions that the span of listener attention is very short. Smoothly running talks are evidently not as easy to understand or as effective as those which are broken up and the attention repeatedly brought to a new focus by question and answer or other such devices.

The favorable comments on the talk requiring the use of pencil and notes show that listeners feel a real need for memory helps and indicate that radio writers and speakers should give more attention to providing such helps.

C. A. HERNDON, *Radio Service.*

REFORESTATION Work in Lake States Aided by Knutson-Vandenberg Act

Reforestation work in the Lake States has been given a decided impetus by the Knutson-Vandenberg Act, approved June 9, 1930. Planting work on the national forests in the region may be completed in from 30 to 40 years, instead of 120 years, as a result of its passage. Some 1,200,000 acres of idle land in Michigan, Wisconsin, and Minnesota, best suited for timber production, will thus be put to work growing wood in about 25 per cent of the time required under the previous authorization. Public sentiment demands an adequate planting program for this vast area of deforested lands, and the passage of more adequate forest crop laws to encourage reforestation by private owner reflects the leadership of the Federal Government.

FIGURE 112.—Drilling Norway pine seed at Beal nursery, Huron National Forest, Mich. The drill, as well as other labor-saving devices developed by Planting Assistant H. C. Turner, has resulted in a greatly reduced cost of production

Reforestation work in the Lake States is practicable at a relatively low cost. Seed extraction and nursery and planting technic have been developed by study, experimentation, and practice through the past 20 years. (Fig. 112.)

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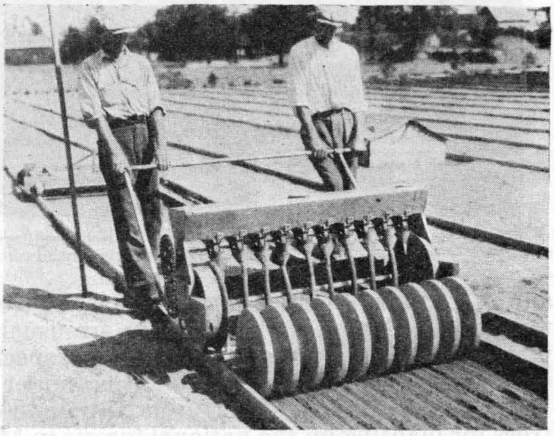

Figure 112.—Drilling Norway pine seed at Beal nursery, Huron National Forest, Mich. The drill, as well as other labor-saving devices developed by Planting Assistant H. C. Turner, has resulted in a greatly reduced cost of production

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The Forest Service's seed-extraction plant at Cass Lake, Minn., has been enlarged and improved, resulting in a 20 to 30 per cent reduction in the cost of seed. This plant furnishes seed to the Federal nurseries, and supplies a considerable quantity at cost to States cooperating in distribution of trees for farm planting. During 1930, 5,693 pounds of Norway pine seed, 985 pounds of white pine seed, 13 pounds of jack pine seed, and 58 pounds of white spruce seed were extracted.

Nursery Capacity Increased

Nursery capacity is being increased to meet the enlarged planting program. Raising trees for planting under field conditions in the Lake States costs from 60 cents to $1 per thousand, depending on the

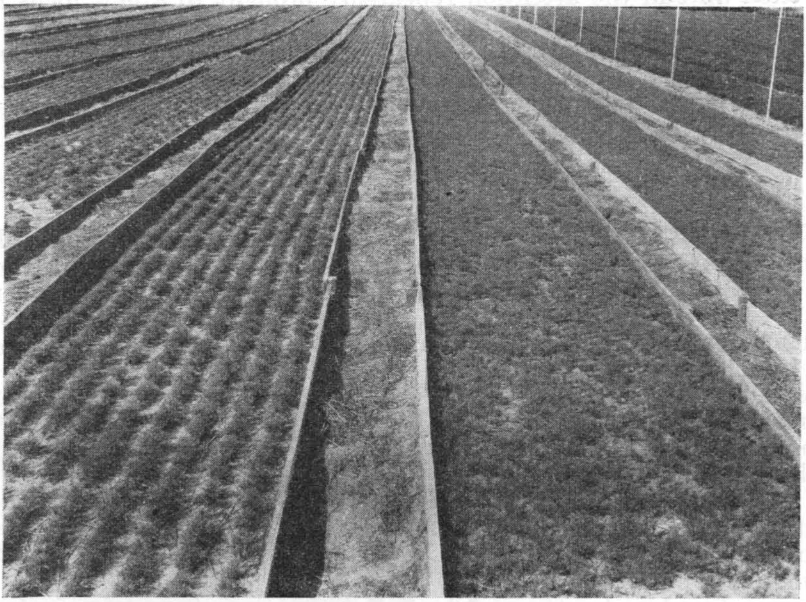

FIGURE 113.—Nursery beds at Beal nursery—1-year-old seedlings in the foreground, and 2-year-old seedlings in upper right-hand corner

annual capacity of the nursery, species of trees, water and soil conditions, etc. Two-year-old seedlings are usually raised, with no transplanting in the nursery except to produce special stock for experimental use or more sturdy stock for planting under rigorous site conditions.

The Beal nursery on the Huron National Forest, which is producing trees for planting on the national forests in Michigan, is now at capacity production of over 7,000,000 seedlings annually. (Fig. 113.) Cass Lake nursery on the Chippewa Forest is being expanded to an annual capacity of 4,000,000 seedlings, to be used on the national forests in Minnesota.

A new nursery at Rhinelander, Wis., will be in full production by the fall of 1933 with a capacity of 10,000,000 trees annually for planting on the national forests of Wisconsin and the upper peninsula of Michigan. The Rhinelander nursery was started in April, 1931, the site being donated by Oneida County. The Kiwanis organization of Wisconsin and upper Michigan is contributing $10,000 toward its development. A

fourth nursery in this region will still be necessary to meet the expanded reforestation program.

FIGURE 114.—Planting trees in furrows. Note fire line in the foreground, and scrub oak now occupying the ground

In planting, furrows are plowed 8 feet apart, with tractor-drawn plows set just deep enough to cut and throw out a ribbon of sod. This furrow eliminates root competition from grass, bracken, and

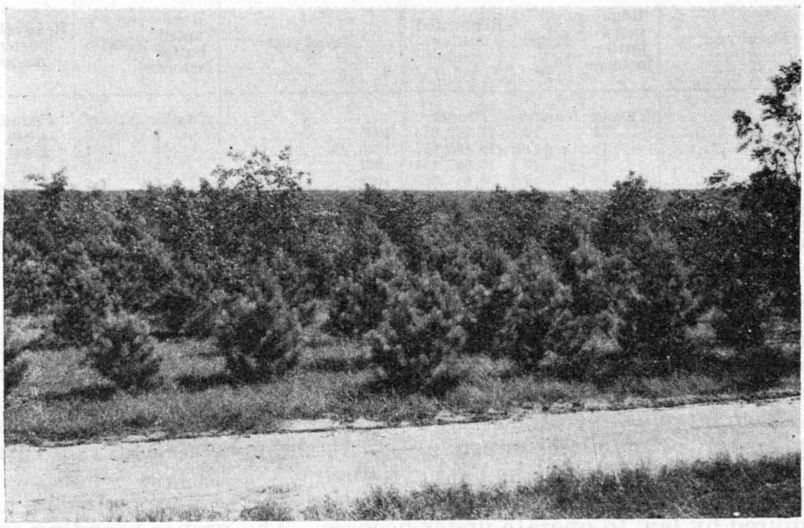

FIGURE 115.—A successful plantation of Norway pine. Photo taken about six years after planting

shrubs. The seedlings are planted 8 feet apart in the furrows, 700 to each acre, by the use of the Michigan planting bar. (Fig. 114.)

Tractors plow 15 to 20 miles of furrow per day. A mile of furrow is equivalent to 1 acre of land. Each motion required in planting a tree has been carefully studied and all unnecessary work eliminated. A carefully trained, experienced planter will regularly plant 2,500 trees per day.

Total cost, from seed collection, through the nursery, to field planting, in 1930 averaged a little under $3 per acre. A large part of the remaining area to be planted, however, consists of more difficult planting site and the average cost will be somewhat higher.

Plantations are given special protection by the fire organizations on the national-forest units. Around each section is a 46-foot cleared fire line, constructed with heavy machinery. (Fig. 115.)

H. Basil Wales, *Forest Service.*

RENOVATED-BUTTER Industry Declines With Decrease in Production of Farm Butter

The manufacture of renovated butter was at one time an industry of considerable importance because of the number of factories engaged in its manufacture and the volume of production. Within the last 15 years, however, the number of factories operating and the amount of renovated butter made have steadily declined. As shown in Table 6, 22 factories operating in 12 States made 27,542,015 pounds of renovated butter in 1917, whereas there were but 5 factories operating in 5 States in 1931 and they produced but 1,498,024 pounds of renovated butter.

Table 6.—*Number of renovated-butter factories operating in the United States in the fiscal years, 1917–1931, and the volume of production*

Fiscal year	Renovated-butter factories	States	Renovated butter made	Fiscal year	Renovated butter factories	States	Renovated butter made
	Number	*Number*	*Pounds*		*Number*	*Number*	*Pounds*
1917	22	12	27, 542, 015	1925	7	5	3, 843, 516
1918	19	11	19, 405, 672	1926	6	4	2, 482, 530
1919	15	10	16, 667, 455	1927	6	5	4, 242, 306
1920	11	9	9, 641, 675	1928	6	5	3, 161, 080
1921	11	8	6, 134, 034	1929	5	5	3, 037, 618
1922	8	6	5, 355, 863	1930	5	5	1, 845, 356
1923	6	5	4, 003, 403	1931	5	5	1, 498, 024
1924	7	5	4, 051, 483				

In the renovating process the quality of the finished product is materially improved over that of the stock used. However, the finished product does not possess good keeping qualities and, scored on a quality basis, is inferior to good creamery butter. Its use as a table butter has been largely superseded in the last few years by use of good creamery butter, or of butter substitutes. At the present time renovated butter is used chiefly by the baking industry.

Renovated butter is a taxable product. Its manufacturers are required by law to operate under licenses. The proper branding and labeling of all renovated butter, whether made into prints or packed in tubs, as well as the enforcement of sanitary regulations and periodic inspection of all licensed renovated-butter factories, is administered and supervised by the Bureau of Dairy Industry. Reports are sent to

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this bureau by the Meat Inspection Division of the Bureau of Animal Industry, representatives of which make at least weekly inspections. Inspection trips are made to these factories by a Bureau of Dairy Industry representative at least twice a year. All cartons and parchment wrappers for renovated butter must be approved by the Secretary of Agriculture. When the product is solidly packed in quantities of 10 pounds or more it must, in every case, be marked on the surface with the words "Renovated Butter," or "Process Butter," in letters not less than one-half inch square, of Gothic style and depressed not less than one-eighth of an inch. It must be similarly marked when sold in print or roll form. The wrapper and carton must be labeled in letters three-eighths of an inch square.

The fact that the dairy farmer generally receives more money for butterfat sold to creameries in the form of cream than for butterfat sold to the country store in the form of dairy butter, shows a desirable trend in rural dairy conditions. The marked decrease in the amount of butter made on the farm and the resultant shortage of packing-stock butter, from which renovated butter is largely made, is undoubtedly the principal factor in the decline of the renovated-butter industry. The poor quality of available packing stock, the natural prejudice against a renovated product, the general improvement in quality of creamery butter, and the increased use of butter substitutes have all contributed to a lessened demand for this product and to the decrease in the amount manufactured.

CHAS. S. TRIMBLE, *Bureau of Dairy Industry.*

ROAD Building on Secondary or Local Projects is Progressing

When people speak of farm-to-market roads it is never clear just what kind of roads they mean, and what other kinds of roads there may be that are not properly to be described as farm-to-market roads. Such references are especially puzzling to those who have thought of all rural roads as farm-to-market roads.

To be sure there are some roads that serve little traffic except that which originates largely on the farms; and some that carry, in addition to the farm traffic, a heavy intercity movement of vehicles. There are some whose total traffic, without regard to character, is light; and others that carry a tremendous traffic; and, by and large, it may be observed that the roads that serve the heaviest total traffic—which are the principal intercity roads—are likely to serve also the heaviest farm traffic, and are, therefore, the most important farm-to-market roads. (Fig. 116.)

Certainly, it is true that the farmers' markets—for buying as well as selling—are in the cities; and the bigger the city the better the market. It appears that the principal distinction to be drawn between roads is one of importance rather than of kind. So, when someone says that, "really we shall have to do something about the farm-to-market roads," we can conclude that what he actually means is that it is time now to be doing something more effective for the improvement of the less important roads, the local or secondary roads as they are called. And so it is.

It is time to extend to the secondary or local roads some more effective improvement; and the time has arrived when that more effective

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CHAS. S. TRIMBLE, *Bureau of Dairy Industry.*

ROAD Building on Secondary or Local Projects is Progressing

When people speak of farm-to-market roads it is never clear just what kind of roads they mean, and what other kinds of roads there may be that are not properly to be described as farm-to-market roads. Such references are especially puzzling to those who have thought of all rural roads as farm-to-market roads.

To be sure there are some roads that serve little traffic except that which originates largely on the farms; and some that carry, in addition to the farm traffic, a heavy intercity movement of vehicles. There are some whose total traffic, without regard to character, is light; and others that carry a tremendous traffic; and, by and large, it may be observed that the roads that serve the heaviest total traffic—which are the principal intercity roads—are likely to serve also the heaviest farm traffic, and are, therefore, the most important farm-to-market roads. (Fig. 116.)

Certainly, it is true that the farmers' markets—for buying as well as selling—are in the cities; and the bigger the city the better the market. It appears that the principal distinction to be drawn between roads is one of importance rather than of kind. So, when someone says that, "really we shall have to do something about the farm-to-market roads," we can conclude that what he actually means is that it is time now to be doing something more effective for the improvement of the less important roads, the local or secondary roads as they are called. And so it is.

It is time to extend to the secondary or local roads some more effective improvement; and the time has arrived when that more effective

improvement will be extended. It not only will be done; it is being done, and the process is already well advanced.

There are very definite reasons why progress in the improvement of the secondary roads under the supervision of the local authorities has been slow in the past.

Local Planning Not Systematic

First, there has been a lack of order and plan in the efforts of the local authorities, and their organization and equipment for the work have been seriously deficient. How many people realize that nearly half of the more than 3,000 counties in the United States are trying to build roads without any engineering direction whatever, and with none but the most primitive road-building equipment? That is a fact; and it is also a fact that, of those counties that do have at least the most

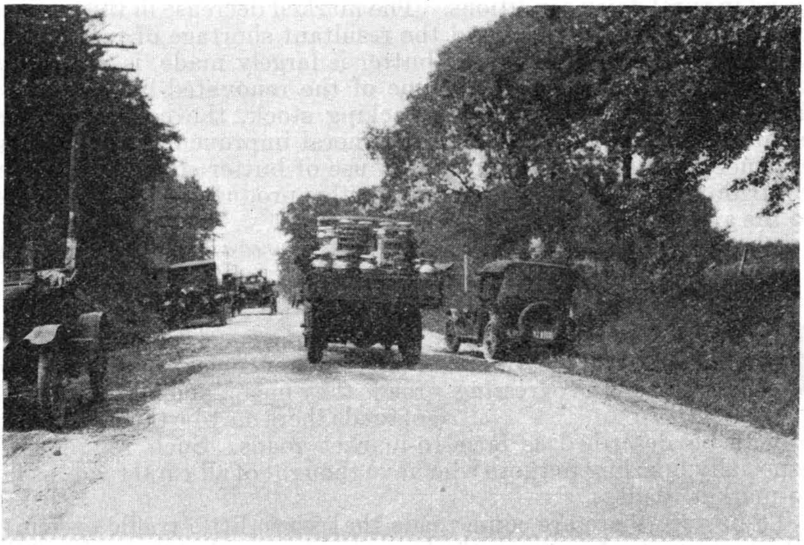

FIGURE 116.—Farm-to-market traffic on a State highway

essential equipment and the basis of an engineering organization, not more than half again are really adequately equipped and organized to handle the difficult task of building roads for modern traffic.

Thus poorly equipped, these counties have been trying, year after year, to improve all their local roads, spreading their slender revenues over a mileage so great that the slight benefits of each year's work have been lost by the beginning of the next road-building season. That is one of the reasons why progress in the improvement of the local roads has not kept pace with the more orderly improvement of the main roads by the State and Federal Governments. But a movement is under way, and already well advanced, the effects of which will soon be evident in a very material improvement of the condition of the local roads. That movement is the steady enlargement of the systems of State and Federal aid roads, which in recent years has been taking place more rapidly than most people realize.

In the selection of the roads that make up these systems, the Federal and State Governments have wisely avoided the mistake of the county

and township authorities. They have limited the extent of the systems to the mileage that could be improved as a whole in a reasonable length of time. The roads chosen have been the most important roads; and together they form a connected network that covers the entire country.

Limitation of Federal Aid System

The Federal law limited the size of the Federal aid system to 7 per cent of the total mileage of roads with the definite purpose of preventing the wasteful scattering of the national appropriations; but it provided that when this limited mileage had been improved other roads could be added.

In six States the mileage selected under the original 7 per cent limitation has already been improved and the size of the system has been increased by adding other roads; a similar extension will soon be possible in a number of other States.

In a similar manner and for the same reason, the States have limited the initial mileage of their State systems. But they, also, have found it possible from time to time to add to the extent of these systems. Between 1921 and 1930 they took over from the counties more than 120,000 miles, and there is no doubt that they will continue to take over additional mileage as rapidly as that already taken is improved.

This process of gradually increasing the size of the Federal aid and State highway systems is having two effects: (1) It brings under the control of the well-equipped Federal and State highway departments mile after mile of the more important county roads and insures that they will be improved as their importance demands; (2) the roads taken over, being the more heavily traveled county highways, are those which have required the largest expenditure. Relieved of them, the counties are able, without increase of local taxes, to expend a larger sum per mile on the remaining mileage and so to effect a more lasting improvement.

Revenue From Road Users

This, then, is one way in which Federal and State improvement of the principal highways—all of them farm-to-market roads—is brightening the prospect for more rapid local road improvement. There is another result of this orderly development that works in the same direction. The improvement of the main roads alone has made possible the great increase in the number of motor vehicles in use. The high class of service afforded to these motor vehicles by the improved main roads has made the owners of the vehicles willing and able to pay ever-increasing sums for road construction and maintenance.

Between 1921 and 1930 the amount of this payment by the owners of motor vehicles increased from $127,000,000 to $850,000,000. The portion of these increasing funds that has gone into the State treasuries has provided the means for taking over from the counties an increasing mileage of the more heavily traveled local roads that have been the counties' greatest burdens. But while the local governments have thus profited indirectly, they have also shared directly in these increased earnings of the main roads; for the share of the motor-vehicle taxes paid directly to the counties has increased from $22,000,000 in 1921 to $165,000,000 in 1930.

The fact that the motor-vehicle owners, as a class, are the most willing of taxpayers, means that they feel that they are more than repaid by the road service they receive in return, and this return and consequent willing tax payment are primarily the result of the improvement of the main roads.

This is the result of the wise policy of selecting for first improvement the most important roads. The improvement of these roads has earned a surplus above their cost of maintenance, which surplus it has been possible to use for the improvement of other roads in the order of their importance. Only by the orderly process that has been followed could this result have been achieved; and it is only by the extension of this same process that the roads of lesser importance can be progressively and adequately improved without laying an increasing tax burden upon real property and particularly upon farm property.

Less Expensive Types of Roads

There is one other development of the last three or four years that will speed the improvement of the local farm-to-market roads. That is the success that has attended the experiments that have been made over that period looking to the development of less expensive types of road surface suitable for the lighter traffic of these roads. (Fig. 117.) That success has been supplemented by the remarkable progress that has been made in the adaptation of labor and time saving machinery for the construction of such roads. By the use of such equipment for the building of the less expensive and yet entirely adequate types of roads that have been developed recently, it is going to be possible in the future to make the secondary-road dollar go farther and do more in the way of lasting and serviceable improvement.

FIGURE 117.—A surface-treated sand-clay surface suitable for secondary roads which can be built at moderate cost

So, there is every assurance that the improvement of the farmers' market roads will go forward with even more rapid progress. The principal roads have already been improved by the Federal and State Governments. By their taking over of more and more of the important secondary roads which are the heaviest burden upon country finances, the task remaining for the counties will be greatly eased. The increased earnings of the main roads in taxes paid by motor-vehicle users will provide increasing revenues for the improvement of county as well as State roads; and by the use of the new methods of low-cost road construction the county revenues thus conserved and augmented will be used more efficiently and productively.

The future of the farm-to-market roads—all of them—has never been brighter. But in order that the results of future expenditures on those which remain under the control of the county and local authorities may

be as effective as possible, it is still desirable that there be a marked improvement in the organization and equipment of the local governing bodies.

Engineering Supervision Essential

Particularly is it desirable that all local road work be carried on under engineering supervision. There may still linger in the minds of some people a feeling that roads can be built without technical direction. There was a time not so long ago when that opinion was entertained by many people. But the demonstration of the effectiveness of technical control which has been made in the improvement of the Federal-aid and State highway systems should have convinced most of the doubters.

However that may be, building roads for modern traffic can not be efficiently carried on without the highest type of technical direction obtainable; and that kind of direction the counties must endeavor to provide for the success of their local road programs—that and the necessary equipment and plant which such direction will suggest.

It is probable that efficient technical supervision and adequate equipment will be obtainable in many cases only by the consolidation of several counties into larger administrative districts. This, for the reason that the overhead cost of the necessary supervision and plant would constitute too large a proportion of the total cost unless it were spread over a greater volume of work than many of the existing counties have to do.

By such consolidation of administrative control, and the employment of the efficient supervision and equipment which will thus be made possible; by following the orderly process of improving the roads in the order of their importance, after the example set by the National and State Governments; by these means will the work that must always remain under local control be brought to a high standard of efficiency. And such are the means by which the local farm-to-market roads will ultimately be raised to a state of improvement comparable with the present state of the primary roads.

THOMAS H. MACDONALD, *Chief, Bureau of Public Roads.*

RODENT-CONTROL Studies Develop Specific Methods for the Different Species

The need for the control of rodents has grown as agriculture has developed. The most important factor limiting rodent abundance—that of seasonally scant food supply—has been removed in many areas for such species as have proved capable of accommodating themselves to changed conditions, and many of them early developed into first-class agricultural pests. Not only is their control necessary for economic reasons, but in some places because of consideration for human health. Examples of this are found in the bubonic-plague infestation over wide areas among the California ground squirrels as well as spotted fever among other ground squirrels in the Rocky Mountain region. Fortunately, an increasing knowledge of the animals' habits and of their physiological responses has made it possible for the Bureau of Biological Survery to develop methods of control that are constantly becoming more specific. Educational methods also are employed by the bureau to win the agricultural population to adopt newer methods in rodent control, in preference to the crude formulas and methods of application formerly in universal use.

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Some years ago W. C. Jacobsen, of the California Department of Agriculture, made a study of the rodent problems in California and of efforts for their solution. The earliest community rodent-control project of which he found record was one conducted about the Santa Barbara Mission in 1808. Since that day settlers in California and in other Western States have found it necessary to resort to intensive campaigns, using every sort of device and agency to protect their crops against the swarming hordes of rodents.

Poisons of various kinds were early used by farmers, some of the baits, in the light of present-day knowledge and practice, being of astonishing strength. Mixtures of 1 ounce of phosphorus to 6 pounds of wheat, and strychnine and cyanide combinations of almost the same proportionate strength, were rather widely used. Poisoned water also was used in some localities with deadly effect, not only on ground squirrels but also on other forms of mammals as well as on birds. One astonishing formula printed in California in 1873 recommended 24 ounces of strychnine to 2 quarts of wheat. This is in startling contrast with the present-day proportions of 1 ounce of strychnine to 20 or more pounds of grain. Phosphorus was a favorite with many farmers because of its cheapness, despite the fact that occasional grain fires were almost certainly traced to its use.

About 1909, S. E. Piper, of the Biological Survey, began investigations of rodent damage, methods of reducing the losses, and the possibility of reducing the proportion of poison in the baits. His tests and those of many subsequent Biological Survey investigators have gradually established four important facts that have aided greatly in making poison formulas more specific against such rodents as become pests:

(1) Animals, including birds, show a great variation in their resistance to any poison; long before it was demonstrated in laboratory tests, control workers knew in a general way that it was much more difficult to poison birds than mammals. (2) Mammals, even races of the same species, show a constant variation in resistance, which can be utilized to advantage in selective control. (3) Sufficent variation exists in choice of food and in manner of feeding among various species to make utilization of these factors feasible in control work, including seasonal and territorial change of baits. (4) In some localities poisons that are effective at one season are ineffective at others, possibly because of food interference with the lethal action.

Some Birds Practically Immune to Strychnine

An example of the first point is found in gallinaceous birds, whose tolerance to strychnine is so high as to amount to practical immunity from its effects. This fact has been demonstrated time and again by feeding tests on quail, domestic chickens, pheasants, and others, and the results made available in a mimeographed leaflet (Bi–1028) of the Bureau of Biological Survey. Pigeons and doves also show the same resistance to strychnine, though in a lesser degree. The lethal dose of strychnine for these birds is approximately four times as great per unit of body weight as in the case of ground squirrels. Other birds also show higher resistance to other poisons than do the mammals commonly classed as pests. Obviously weakening the formula by spreading the poison over greater quantities of bait material would operate to the advantage of the resistant groups. For example, the old phosphorus formula required only two or three kernels of wheat to kill the average

pigeon; in the strong strychnine mixtures of the early days 20 to 40 kernels would be sufficient; while in formulas recommended at present a lethal dose requires about 100 kernels. Where poison is distributed in small baits intended for the less-resistant forms, as ground mammals, it is apparent that the chances of an individual bird picking up 100 kernels of grain are much less than of its getting 2 or 20 or 40.

The difference in resistance to poison by closely related forms of animals, even of races of one species, is exemplified in Douglas's ground squirrel (*Citellus douglasi*) of northern California and western Oregon. This rodent is easily susceptible to strychnine, while in California south of the San Francisco Bay region the nearly related California ground squirrel (*C. beecheyi*) is one of the most resistant.

In Montana, northern Idaho, and eastern Washington the Columbia ground squirrel (*Citellus columbianus*) is one of the most difficult to handle. Strychnine is much less effective against this rodent in this territory than in northeastern Oregon, and for many years this was not understood. In 1928, when the species was divided into two races, the line of demarcation followed closely the boundary that had been noted in the differences in reactions to poison.

Curiously enough, the Columbia ground squirrel and the Oregon ground squirrel (*Citellus oregonus*), which are found more or less closely associated in northeastern Oregon, have such a marked difference in susceptibility to strychnine that it is possible to prepare a grain mixture to kill the latter without harming more than a very small percentage of the Columbia squirrels, even though these may feed freely on the bait. This fact complicates control of the Columbia squirrel with bait intended for use against the Oregon species.

Food Preferences Utilized

An example of the third point is found in the fact that small birds have been found in a majority of tests to prefer wheat to barley or oats, while ground squirrels of several species prefer the coarser grains to the wheat. Advantage has been taken of this, and as a result wheat has been gradually eliminated as a bait material, despite the fact that at the time organized study of the control problem began, it was the bait most widely recommended and used for rodent control. Many tests repeated at various seasons over wide territory have demonstrated this habit of discrimination to be general, even though occasionally the squirrels will eat one grain as readily as another, and less frequently small birds will not display any selectivity even though given a choice.

The development of pouch poisons for ground squirrels as opposed to stomach poisons is another and outstanding example of increasing efficiency in control through taking advantage of the rodents' manner of handling foods. Baits can be prepared in such manner as to release poisons in the mouth and thus kill ground squirrels that pick up quantities of the grain in their cheek pouches, rather than await the much slower absorption through the stomach. Consequently smaller proportions of poisons than previously were thought necessary are now used in the baits.

Neither pouch nor stomach poisons, however, are particularly effective against the Columbia ground squirrel because this species does not often pouch or eat sufficient grain without hulling it to carry a killing dose. Successful control of this species has been obtained by preparing a coated bait with flour paste, which is brittle and easily flakes off in the mouth as the grain is hulled.

The California ground squirrel furnishes the outstanding example of seasonal variation in response to poison. During the summer and fall months pouch poisons carrying strychnine as the lethal agent are quite generally successful. Spring operations are markedly less so, yet other poisons substituted for strychnine at this season are satisfactory. Variations in feeding habits and character of foods taken, and perhaps food interference with the action of poisons, play a part in producing this state of affairs.

Much educational work on the part of the Biological Survey has been necessary to teach the desirability of undertaking control not only at the proper season but also on a community and crew basis. Organizing control work on a community-wide basis accomplishes two things: It reduces the possibility of reinfestation from one farm to another; and it greatly reduces the length of the poisoning season. Where the practice of covering a considerable territory at one time does not prevail, poison is commonly exposed by farmers at one point or another over a period of months. Formerly they would place handfuls here and there, on stumps, in logs, and at other places where the rodents might find it, sometimes many days later. For these sporadic practices there has been largely substituted the community method of scattering over a given area sufficient baits of grain directly at the entrances of the burrows of the rodent it is desired to kill, and doing this at a season when that animal is feeding on grain. This method normally results in a good rodent clean-up over the entire area treated and consequently in lessened necessity for further exposure of poisons during that season.

Poisoning has thus far proved to be the most effective method of dealing with rodent pests. Bounties have resulted either in fraud or in unprofitable expenditure of large sums of money. Guns, traps, and other mechanical devices are hopeless means of control in the face of the endless hordes of rodents always present. So-called viruses, such as those widely advertised for controlling rats, have never been satisfactory and, furthermore, are looked upon with disfavor by many health authorities as a possible source of spread of diseases to human beings. They have not been used in control campaigns conducted by the Biological Survey.

Of fumigants for burrowing species, carbon bisulphide is the most satisfactory thus far employed. It has been widely used against California ground squirrels, in some places with great success. Though too expensive for practical use in heavy infestations, carbon bisulphide is valuable chiefly as a follow-up agent, where the rodent population has already been greatly reduced by poison. Calcium cyanide is useful as a fumigant to a certain degree, but it has not completely fulfilled the high hopes early held for it by control workers. Fumes of sulphur, gasoline, petroleum distillate, and kerosene also have been tried with varying success, but none of these substances has yet come into general use.

Poisoning and fumigating are the only known methods offering any possibility of satisfactory solution of the rodent-control problem, and of these, poisoning is the more practicable. Contrary to the opinion commonly held, it is possible, with our present knowledge of the characteristics of poisons and of the habits of animals, so to select, prepare, and expose baits as not seriously to endanger animals other than the rodents for which the poisons are intended. Ordinary precautions, of course, are always to be taken in handling any poison, so as not to endanger human beings, domestic stock, or valuable wild life.

IRA N. GABRIELSON, *Bureau of Biological Survey.*

RUBBER Plant Hybrids of Madagascar Species Prove Vigorous in U. S. Hybrids of two species of Madagascar rubber vines, *Cryptostegia madagascariensis* and *C. grandiflora*, are being studied and propagated in southern Florida. In the past a good grade of rubber known as "palay" has been obtained from the wild plants in Madagascar by primitive methods. One of the species (*C. madagascariensis*) was introduced into Florida more than 30 years ago and has been planted extensively as an ornamental (fig. 118), while *C. grandiflora* has escaped from cultivation and become established in the West Indies and in many portions of Mexico. Plantings of both species have been made at several points in southern California and Arizona, and the plants have grown well for several years.

FIGURE 118.—A branch of Cryptostegia flowers

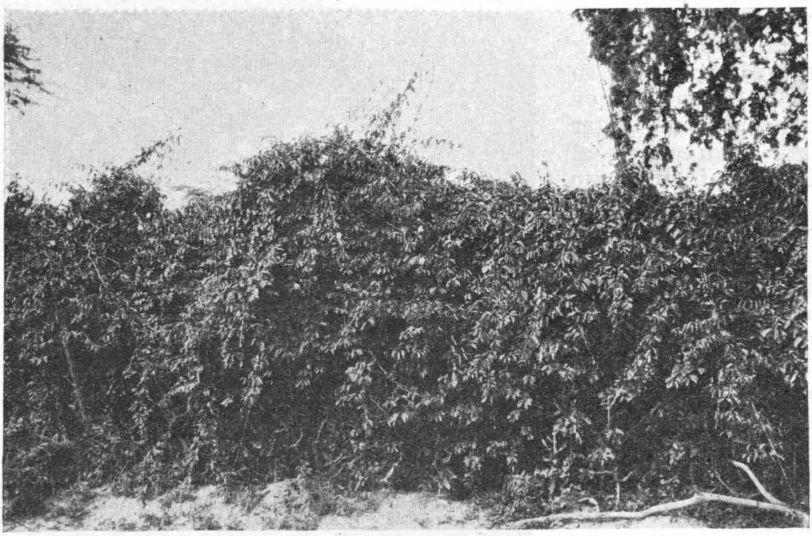

FIGURE 119.—*Cryptostegia grandiflora* growing over a hedge near Gonaives, Haiti

The two species have been mistaken for each other and the names often are applied to the wrong plants. Yet the two are distinct and hardly to be confused once the real differences are recognized. The

FIGURE 120.—A plant of *Cryptostegia madagascariensis* growing in Fort Myers, Fla.

most striking of these differences are the type of growth and leaf characters, *Cryptostegia grandiflora* having a stronger tendency to grow as a trailing vine with long whiplike shoots (fig. 119) and broadly elliptical leaves with reddish midribs, while *C. madagascariensis* has narrower, firmer, and smoother leaves with white midribs. When grown on lawns or in borders, the plants of the latter species usually are trimmed to a rounded form. (Fig. 120.)

Hybrids Show Increased Vigor

The hybrids are from seed from a single pod obtained from a plant of *Cryptostegia grandiflora* growing near Miami, Fla., in 1926. In growth they have shown a greater vigor than plants of either of the two parent species. They are of a strong whiplike type of growth (fig. 121), similar to that of *C. grandiflora*, but their leaves bear a closer resemblance to those of *C. madagascariensis*, and their floral characters are intermediate between those of the parent species.

Numerous analyses of the hybrids in comparison with the parent species have been made. In all com-

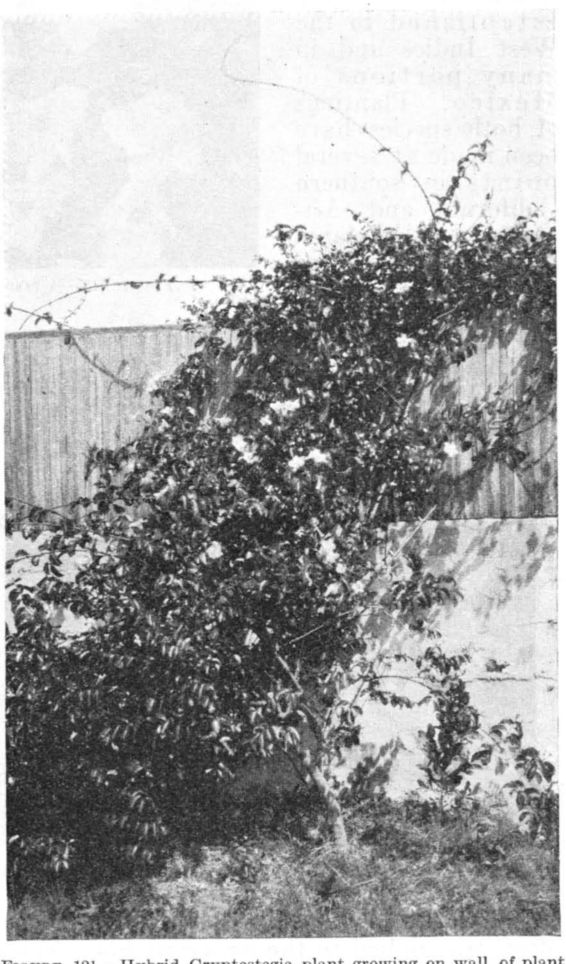

FIGURE 121.—Hybrid Cryptostegia plant growing on wall of plant shelter near Miami, Fla.

parisons the hybrids have had a higher percentage of rubber than either *Cryptostegia grandiflora* or *C. madagascariensis*, in addition to having a greater total yield, due to their increased growth. The mean rubber content of 20 plants in southern Florida remained nearly constant from September, 1930, through January, 1931, monthly analyses showing a mean of from 4.18 to 4.97 per cent rubber. The highest individual rubber content recorded during this period was 6.98 per cent. The mean rubber content of 20 plants of *C. madagascariensis* analyzed monthly from August to December varied from 1.75 to 2.22 per cent, the highest individual rubber content being 3.51 per cent. The mean rubber content of 20 plants of *C. grandiflora* analyzed in August, September, and October varied from 1.63 to 1.90 per cent, the highest individual rubber content being 2.94 per cent.

In contrast with desert plants, which secrete less rubber under conditions of vigorous growth, the species of Cryptostegia yield a greater percentage of rubber under those conditions, and it appears probable that the higher rubber content of the hybrids may be connected with their increased growth vigor.

LOREN G. POLHAMUS, *Bureau of Plant Industry.*

SEED-CORN Maggot Injury Avoided by Suberizing Potato Seed Pieces Before Planting

Newly planted potato seed pieces of the early spring crop on the eastern coastal plain are often seriously injured by an insect commonly known as the seed-corn maggot (*Hylemyia cilicrura* Rond.). This insect occurs throughout the temperate regions of North America and is known to attack a wide range of plants. In addition to the potato, sprouting seed and seedlings of corn, beans, spinach, cucumbers, turnips, melons, and peas are subject to attack. The adult of the maggot is a fly smaller than the house fly and grayish in color. The female deposits the eggs in the soil, and the maggots develop from these.

Injury to potato seed pieces results from holes or tunnels cut into the potato by the maggot during feeding. The feeding always begins at some spot on the cut surface of the potato seed piece, as the maggot never attacks the uncut surfaces. From the point of entry the maggot tunnels into all portions of the seed piece. Several maggots may attack the same seed piece; as many as 75 have been found in one piece. Heavy infestations of the insect cause the complete destruction of the seed piece. Less severe attacks result in the development of weak, spindling sprouts from the partially devoured seed pieces. The damage is greatest during seasons when seed germination and growth of the young plants are retarded by unfavorable weather and other conditions. In the spring of 1921, when the weather which followed the planting of early potatoes along the entire Atlantic seaboard was unfavorable, injury from attacks of this insect was unusually severe. As much as 50 per cent of the plantings in the commercial-production areas of the Carolinas was destroyed.

Potato seed-piece decays are often closely associated with seed-corn maggot infestations. Seed pieces that show only a slight degree of decay on their cut surface are very susceptible to attack by the insect. Feeding of the maggots on such seed often causes the decay to be

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spread to all portions of the tuber. Decay usually takes place in badly infested seed pieces either before germination or while the plant is small.

Experiments for Control of Seed-Corn Maggot

Studies on the control of this pest have revealed that certain farming practices greatly increase the possibilities of seed-corn maggot attack. Among these are the planting of potatoes in soils containing partly decayed remnants of a recently grown winter crop and the use of large quantities of organic fertilizer materials. However, for cultural reasons it is hardly possible for the commercial grower to select vegetation-free soil and abandon the use of organic fertilizers. No chemical treatment that was tested prevented the seed-corn maggot from feeding on seed potatoes.

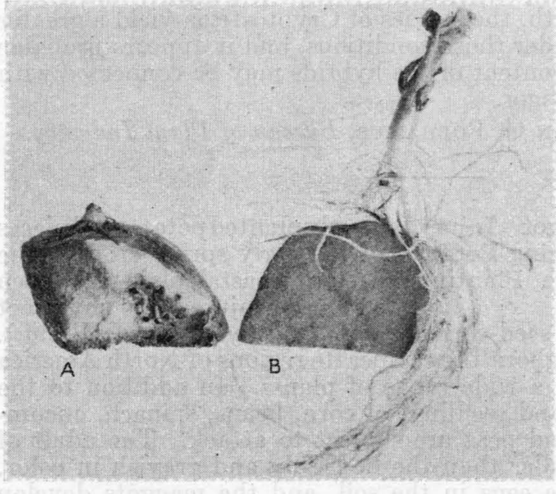

FIGURE 122.—A, Potato seed piece planted immediately after being cut, showing maggots at work and a weak sprout; this seed piece was honeycombed by maggots; B, suberized seed piece cut two weeks before planting and planted at the same time and under the same conditions as the one shown in A

Suberization, or corking over, is nature's way of healing the cut surfaces of the potato and will take place in the soil if the conditions are favorable. However, at the time the early spring potato crop is planted, suitable conditions for proper suberization of the seed are often the exception rather than the rule.

Suberization of cut potatoes in advance of planting has been a subject of study for several years. In investigations aimed at control of the seed-corn maggot, the objects have been to devise practical means of suberizing cut potatoes on the farm and the testing of such seed as a means of preventing seed-corn maggot injury. The corked seed has been compared in field experimental plats with seed planted immediately after being cut. Planting of freshly cut seed is the usual commercial practice in regions where seed-corn maggot injury is most prevalent. These experiments show quite conclusively that the use of well suberized seed potatoes will practically eliminate seed-corn maggot injury regardless of the type of fertilizer used or the quantity of decaying vegetation in the soil. (Fig. 122.) In comparison with seed planted when freshly cut, well-corked seed potatoes have averaged a slight increase in yield even in plats where there was no seed-corn maggot infestation of the freshly cut plantings.

Method of Suberizing Seed Before Planting

Effective suberization of the cut surfaces of seed potatoes can be obtained if the seed is thoroughly disinfected, cut, and stored for 10

days to 2 weeks at a temperature of 55° to 65° F. and at a humidity of 80 to 90 per cent.

A storage cellar is usually a satisfactory place in which to store cut seed pieces, as the proper temperature and humidity for suberization are easily maintained. Before putting in the cut seed the cellar should be thoroughly cleaned and all decayed vegetable matter removed. It is further advised that the walls, floors, and all storage containers, such as baskets or barrels, be sprayed with a suitable disinfectant, such as 5 per cent copper sulphate or 2 per cent formalin or the solution used for treating the potatoes, before they are cut, to insure against development of decay organisms on the freshly cut surfaces. If a cellar is not available, any room can be partitioned off for this purpose with one of the commercial insulating boards. If a dirt floor can be provided, the problem of maintaining the proper humidity will be relatively simple, for this can be accomplished by keeping the floor moist. If it is necessary to heat the storage room to maintain the desired temperature, a small brooder stove can be used with convenience and safety.

Immediately after being cut (they should not be allowed to dry off) the seed pieces may be stored in crates, baskets, or barrels. At 24 and 48 hours after cutting, the seed pieces should be aerated by being carefully poured from one container to another. This treatment also serves to break apart the pieces that have stuck together. Suberized seed should not be kept in sacks, as the healed surfaces will be readily rubbed off and the purpose of the storage defeated.

It has been found advantageous to move the cut seed, after the healing or storage period, to a room or a building where the humidity is about 60 per cent and the air temperature between 55° and 65° F., keeping the seed there for a day or two in order to allow the healed surfaces to dry and toughen before the seed is handled for planting.

W. J. Reid, Jr., *Bureau of Entomology*,
W. M. Peacock *and* R. C. Wright,
Bureau of Plant Industry.

SEED-TESTING Service Protects Farmer in Case of Many Principal Crops Because of the service that seed testing renders to agriculture, no farmer need plant seed without knowing much about its possible crop-producing value. Most States require that agricultural seeds sold within them shall carry a statement showing the chief factors in their agricultural value. The analysis tags or labels attached to the seed at the time of sale give information on some or all of the following particulars as to each lot of seed: Kind of seed; percentage of pure seed; percentage or number of noxious and other weed seeds; percentage of other kinds of crop seed; percentage of dirt, chaff, and other worthless matter; percentage of germination (that is, percentage of the pure seeds producing seedlings capable of continued growth—those of agricultural value); and origin.

The farmer has a vital interest in the factors disclosed by the analysis of seeds. He is interested in knowing that he is getting the kind of seed he wants and that it is not adulterated with some other kind of similar-looking seed. While there is comparatively little adulteration of agricultural seeds in the United States at the present time, the statements on some dealers' tags are designed to mislead rather than to enlighten the purchaser.

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A typical case of such misleading labeling which recently came to the attention of the United States Department of Agriculture is given below:

Statement on label attached to the seed		Found on analysis	Per cent
RED-CLOVER SEED MIXTURE		Red-clover seed	50. 74
	Per cent	Sweetclover seed	32. 79
Pure seed	73. 76	Other crop seed	8. 81
Crop seed	20. 54	Timothy.	
Alsike.		Alsike clover.	
Timothy.		Alfalfa.	
Sweetclover.		White clover.	
Inert	2. 40	Canada bluegrass.	
Weed seeds	3. 40	Inert	4. 22
Buckhorn.		Weed seeds	3. 44
Plantain.		Germination:	
Sour dock.		Red-clover seed	70. 50
Foxtail.		Hard seeds	5. 00
Carrot.		Sweetclover	50. 50
Germination	85. 00	Hard seeds	8. 00

The seed to which the label was attached had been transported by truck from one State into another and was being sold from the truck.

Farmers should be particularly critical of seeds that are offered in one State carrying the analysis of a dealer in another State, unless the dealer in the other State is known to be a reliable one.

Buyer Should Know Weed-Seed Content

The purchaser is interested in the weed-seed content, so as to know when he is being offered seed containing large proportions of seeds of the more common weeds, or when the seed contains even a small number of seeds of weeds that are not already growing on his land and that may prove troublesome and difficult to eradicate. The seeds of many troublesome weeds may remain alive in the soil for 20 to 50 years or longer.

The farmer is interested in knowing what proportion of the bulk of seed he is buying will produce seedlings that will grow into plants under favorable conditions in the soil. No seed is of agricultural value unless it is capable of doing this. He is also interested in knowing the type or variety of the seed he is buying, as this determines in large measure its adaptability to local conditions and to his particular use. The determination of type and variety is the most difficult of all determinations. In some cases it can be made from an examination of the seed itself. In many cases the seeds of different varieties are not definitely distinguishable, and then the trueness to type or variety depends on certification based on field inspection, on the reliability of the seed-selling agency, or on subsequent growing of the crop.

In the case of many of the principal crops, it is now possible to buy seed that has been certified as to type or variety by a State agency. This certification is based on field inspection followed by analysis of the seed. This State-certified seed is now obtainable through seed-handling agencies, both cooperative and private, as well as from the producers.

Sealed Under State Supervision

Seed that is State certified as to type or variety is sealed under State supervision in sacks of various sizes so that it goes to the ultimate consumer in the original, unopened package. Seed sold in any State

under the label required by that particular State carries the guaranty of the seller as to the statements made on the tag. Seed sold by a dealer in one State to a farmer in another State is not subject to the law governing the sale of agricultural seeds in the State into which the seed is shipped, and the purchaser is largely unprotected. The majority of cases of the sale of misbranded and worthless seeds which are reported to the United States Department of Agriculture are those in which the seed has been sold from one State to a farmer in another for his use and so is not subject to the protection afforded by State law.

The Federal seed act prohibits the interstate shipment of fraudulently misbranded seeds. In most States authority is granted under State law to withhold from sale or to seize any seed which the State finds to be misbranded, while under the interstate clause of the Federal seed act it is only possible to seize seed that is fraudulently misbranded. Obviously, then, the farmer who buys his seed in his own State has greater protection than the farmer who buys seed from outside his own State. In all cases where the purchaser has any doubt as to the correctness of the label, accurately drawn samples should be sent for analysis and test to the seed-testing laboratory of the State in which the purchaser lives, or to the Division of Seed Investigations, Bureau of Plant Industry, United States Department of Agriculture, Washington, D. C. The facts as to quality on which the various forms of protection to the seed purchaser have been built up are directly dependent on seed testing.

Seed testing protects the farmer in his purchases of agricultural seeds in so far as the farmer avails himself of the protection that is his for the asking.

E. Brown, F. H. Hillman, *and* E. H. Toole,
Bureau of Plant Industry.

SHEEP are Handled Advantageously Under the Bedding-Out System For many years the most progressive sheepmen of the Southwestern States have recognized that open, loose herding of sheep and 1-night bed grounds are of special value in the production of fat, healthy sheep and are of great benefit to the range. To determine from actual practice the results of this system as compared with those of the old system of returning to an established bed ground, a study was made by the Forest Service on the Madison National Forest in south-central Montana. Definite information was desired on (1) the possibility of open, quiet herding without returning to an established camp at night; (2) the advantages of such a system to the range and to the sheep as compared with the old system; and (3) the method and organization necessary for successfully applying the new system. Several flocks of sheep were handled under each system and under such range conditions as would make the results comparable and reliable.

The Bedding-Out System

In handling the sheep under the bedding-out system they were, whenever it was practicable, allowed to camp where night overtook them. Leaving the bed ground early in the morning, they would always have fresh feed. (Fig. 123.) They soon drifted away from the bed ground openly and quietly, the herder, if necessary, turning the

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leaders. As soon as the sun was shining brightly they customarily bedded down in the shade of the pines or under browse along creek beds. In the afternoon they commenced to graze again. The herder would let them drift, turning the leaders or retarding their progress if necessary. In the evening they gradually pulled together and by dark they were all in a band, and were allowed to bed for the night.

Herding Under the Old System

Under the old system the sheep were returned to an established camp each night. They were herded practically all day and kept in a more or less compact band by dogs. At night they were gradually herded back to the old bed ground. Dogs were used frequently in turning the leaders and keeping the tail end of the herd up with the leaders. The herder's camp was moved five times in 50 days. Camps were always near a small spring or stream and vegetation in the immediate vicinity was almost completely destroyed by the trailing to and from the bed grounds.

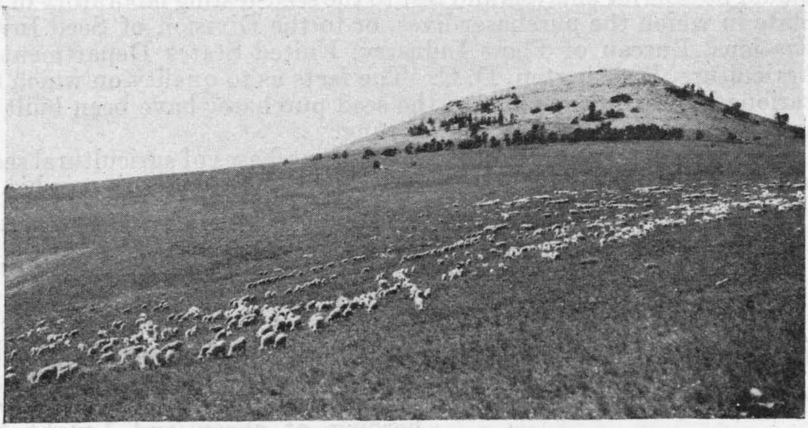

FIGURE 123.—The band spreading out in the early morning on clean feed

Comparison of the Two Systems

It was found that the sheep handled under the old system of close herding and returning to a permanent camp ground each night used 47 per cent more range than the sheep that were allowed to graze quietly and openly and bedded where night overtook them. (Fig. 124.)

The "blanket" system is especially adapted to the production of early maturing lambs. Under the old system sheep are likely to be dogged and jammed, and the lambs get little rest and little sleep, and are frequently separated from their mothers. When the sheep are allowed their freedom the lambs feed and rest naturally, grow much faster, are cleaner, more easily handled, and less likely to be crippled.

The average net gain per day of the lambs under the bedding-out system was 0.43 pound compared with 0.38 pound made under the old system, making 0.05 pound per day per head in favor of the new system. Lambs grazed under both systems were trailed to Alder, Mont., and sold at 5 cents per pound. At this figure the average gain

in value per day per head under the bedding-out system was $0.0215, as compared with $0.019 made under the old system, or a net gain in favor of the new system of $0.0025 per head per day. On a flock of 1,000 lambs the net gain per day would be $2.50, or for a grazing season of 90 days the net gain would be $225 in favor of the bedding-out system. In other words, each lamb grazed under this system made a gain of 22½ cents per head more in a period of 90 days than did the lambs grazed under the old method.

Method of Handling Accounts for Increase

This increase in weight of the lambs grazed under the bedding-out system and the increased grazing capacity of the range can be attributed entirely to the method of handling the sheep, since (1) the ewes and lambs were all high-grade range sheep; (2) were grazed on practically the same kind of allotments; (3) were supplied with similar facilities for watering; and (4) were salted regularly and in sufficient quantities to keep their appetites normal.

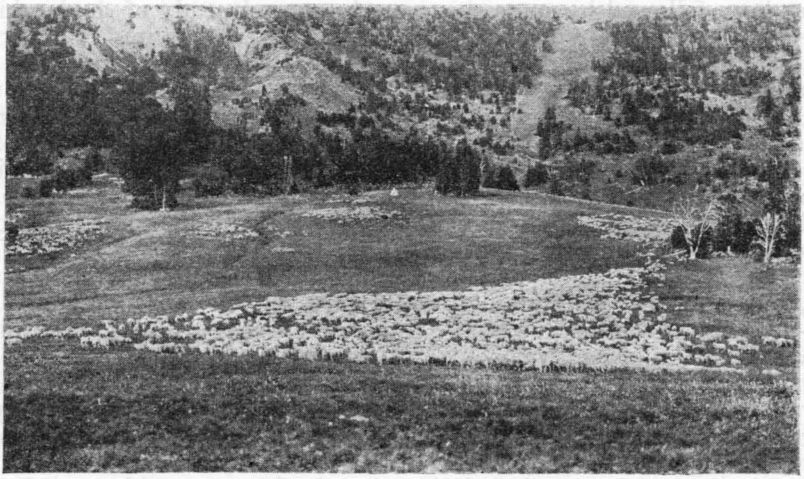

FIGURE 124.—Sheep ready to bed down near the herder's tepee

New System Costs No More

The amount of labor is practically the same under both systems. Time consumed in driving the sheep to and from an established bed ground is offset by the time consumed in moving the tepee to where the sheep are to be bedded down at night. Ordinarily in the Madison Forest a tepee and a saddle horse for moving it are required as extra equipment under the improved system.

A timbered range is as suitable for the blanket system as are open park areas. According to one herder, it is the only method of handling sheep in timbered range. The best results, he said, are obtained by turning sheep loose because they are more nervous in timber and the use of dogs increases this nervousness.

GLEN A. SMITH, *Forest Service.*

SHEEP Culling Largely on the Basis of Dryness Is Seldom Justifiable

Approximately 60 per cent of the income normally to be expected from a range ewe is derived from the lamb she raises; the remaining 40 per cent represents the value of her fleece. Hence the importance, to the range-sheep industry, of a high-percentage lamb crop measured in lambs that reach market age or maturity, can be readily recognized.

The ewes which produce the normal two crops each year—a lamb and a fleece—are the profitable ones and they must make up for the loss that is likely to be sustained on ewes in the dry band before the enterprise as a whole can show a profit. Since in a normal year about 10 per cent of the ewes in a flock may not drop lambs, the question arises as to whether dryness in young ewes may be taken as an indication of a likelihood of their poor lambing performance in later years, and whether culling should be done with considerable attention to that factor.

Records of More Than 2,000 Ewes Studied

The practice of culling on the basis of two consecutive years' dryness has been followed by some sheep producers. A study of the lambing records of the United States Sheep Experiment Station at Dubois, Idaho, indicates that dryness in range sheep is probably much less an inherited tendency than the result of chance or a combination of outside factors. Accordingly, the culling of young ewes chiefly on the basis of their failure to produce lambs as 2-year-olds or as 3-year-olds is not justified. The records further indicate justification for retaining in a flock even those ewes which fail to produce lambs both as 2-year-olds and as 3-year-olds provided they are superior individuals in both fleece and mutton conformation.

The records cover a period of 10 years, during which a total of 2,009 purebred Rambouillet ewes were in the lambing bands as 2-year-olds. Of this number 78.9 per cent lambed during their first lambing year, or as 2-year-olds. After the usual cullings practiced at this station, 396 of the 423 ewes which failed to lamb as 2-year-olds were retained in the lambing bands. Of these 396 ewes, 90.4 per cent produced lambs as 3-year-olds, as compared with 92.4 per cent for the 3-year-old ewes which had lambed as 2-year-olds. From this showing it can be concluded that dryness in 2-year-old range Rambouillet ewes can not be taken as an indication of dryness in succeeding years, and that culling on that basis is unsound.

Consider now those ewes which failed, both as 2-year-olds and as 3-year-olds, to produce a lamb. During the 10-year period studied there were but 37 such ewes among the 2,009 sheep. Twenty-four were retained after culling, and 20 of the 24, or 83.3 per cent, produced lambs as 4-year-olds. This is a poorer showing by approximately 10 per cent than the lambing record of all the other 4-year-old ewes which had lambed previously, during either their first or second lambing seasons, or both.

Other Factors More Important than Dryness

The number of ewes which were dry for two succeeding years may be too small to lend any great significance to their lambing percentage record as 4-year-olds. But it is interesting to note that of a total of 1,361 4-year-old ewes only four failed to produce lambs during at

least one of their first three lambing years. Furthermore, the record shows that of 768 ewes that were in the band for five consecutive lambing periods, those which failed to lamb the first year showed but slightly inferior records for the four succeeding lambing periods, than did those which lambed in their first year.

The conclusion seems warranted that such well-recognized factors as size, trueness to type, mutton quality, and character and weight of fleece deserve more consideration when culling the ewe flock than does the factor of previous dryness. In other words, a ewe of excellent individuality offers better promise of future performance for her owner, though she has failed to lamb as a 2-year-old, than does a distinctly inferior individual which has a lamb to her credit.

JOHN A. STOEHR, *Bureau of Animal Industry.*

SHEEP Improvement Through Breeding Is Demonstrated by U. S. Shropshire Flock Frequent inquiries received by the Department of Agriculture concerning its experiments dealing with sheep and wool production suggest the desirability of brief printed descriptions of its flocks. The 1927 Yearbook of Agriculture discussed the foundation flock used in developing the department's flock of Southdown sheep. Similarly the present account deals with the Shropshire flock maintained at the United States Animal Husbandry Experiment Farm at Beltsville, Md., which is about 13 miles from Washington, D. C. The portion of the farm devoted to sheep studies is designated as "Sheep Acres."

The original purchase of the department's foundation flock of Shropshire sheep was made in December, 1919, when eight select yearling ewes were obtained from the flock of W. G. Miles of Evansville, Wis. These ewes were of Bibby and Minton breeding. primarily, and were of excellent mutton conformation.

This small flock was increased in 1921 by a purchase of 12 ewes selected from a flock of 80 ewes which were being dispersed by Glimmerglen Farms, Cooperstown, N. Y. These ewes were largely of Duke of Westminster breeding, many of the ewes having been imported from that famous British flock. Other additions to the flock were made as follows: In the spring of 1924, six choice yearling ewes were purchased from Iroquois Farm, Cooperstown, N. Y. In 1927, 10 ewes of Buttar breeding were obtained, and in 1930 two Buttar and two Tanner ewes were obtained for the department by F. W. Harding of Waukesha, Wis. In all, 40 ewes have been purchased in the establishment of this flock. All were selected for their type, excellence of mutton conformation, and the desirable characteristics of their fleeces.

Two Rams Principally Used

The first two rams used in the flock were of Duke of Westminster breeding. These were followed by two rams obtained from Iroquois Farm, three imported Buttar rams, A. J. Moore No. 201, registration No. 599091 (fig. 125), and Broughton, No. 3921, registration No. 642591. The last two rams mentioned have been used most extensively and the ewes now in the flock are practically all sired by these rams. (Fig. 126.) Young rams sired by each of these rams are now being used to a limited extent in the flock.

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In the development of this flock all the best ewe lambs nave been retained for breeding stock, and about one-quarter of the entire flock is being replaced each year by the addition of yearling ewes. Of the 40 ewes purchased only 10 now remain in the flock, and only 8 of the original ewes have offspring in the flock. This number will no doubt be further reduced as additional information is obtained on the offspring of many of those which still remain in the flock.

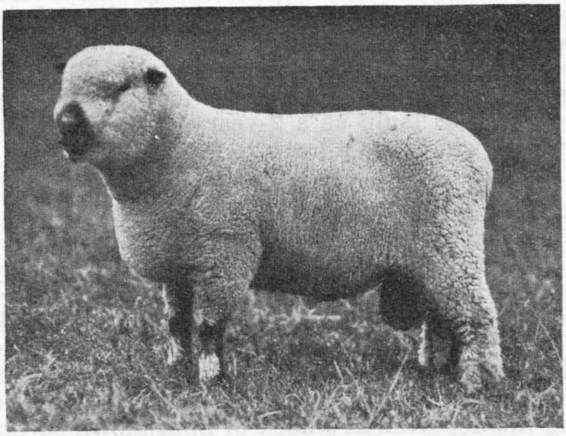

FIGURE 125.—Stud ram A. J. Moore No. 201, used at the United States Animal Husbandry Experiment Farm, 1924 to 1930

One Ewe Particularly Outstanding

Of all the ewes purchased, the one of outstanding merit was W. G. Miles No. 1031, registration No. 518-502, which is now represented in the flock by nine female offsprings and two stud rams. This ewe has been able to produce offspring which were not only excellent themselves but which reproduced offspring also of such excellent type and conformation that they were retained in the breeding flock.

The purchase of foundation stock has now been discontinued and 25 per cent of the entire ewe flock traces directly to this ewe as well as

FIGURE 126.—Yearling ewes added to the flock in 1926. The photograph was taken soon after shearing to show mutton conformation. These ewes were sired by the ram shown in Figure 125

to two stud rams. It is probable that in time the blood of this ewe will occur in the ancestry of the entire flock.

The flock now consists of 36 ewes, which are reasonably uniform and of a high degree of excellence in type and mutton form. The present superior merit of this flock has been developed through years of careful

selection and corrective matings on a basis of the production of sire and dam rather than on individual excellence of each parent.

C. G. Potts, *Bureau of Animal Industry.*

SNAP-BEAN Seed Grown in West is Relatively Free of Blight and Anthracnose

The two most important diseases of beans, blight and anthracnose, are both seed-borne. If infected seed be planted and the weather conditions are at all favorable, the young seedlings may develop one or both of these diseases. From such seedlings the disease may spread to other plants and cause heavy losses to the crop. Blight occurs practically every year in most sections of the United States east of the Rocky Mountains, and to some extent in the Intermountain States of Colorado, Utah, Montana, and Wyoming, and to a very limited extent in Idaho. It rarely if ever occurs in California. Anthracnose is not so general in its distribution, being restricted largely to regions east of the Mississippi River. It is seldom found in Colorado or in any of the States farther west, and when it does occur it is never so prevalent as to be of consequence. Anthracnose occurs only in regions and during seasons having considerable rainfall and where the nights are cool, which explains why it may be present in some seasons and entirely absent in others.

Growing of bean seed by seedsmen for commercial purposes is largely confined to types used for canning and for market-garden purposes, that is, the snap beans. The dry-shell bean seed is mostly saved from the previous crop by the farmer growing it, and for that reason will not be taken into account in discussing sources of seed.

Grown in Widely Separated Regions

Snap-bean seed is grown in two widely separated regions of the United States, that is, in the East and in the West. In the East most of it is grown in Michigan and New York; in the West it is grown in Colorado, Wyoming, Montana, Idaho, Utah, a little in California, and to a lesser extent in some of the other States.

Eastern-grown seed is likely to be affected with blight every year, and by anthracnose if conditions are favorable for its development. A study of these two diseases over a period of years has shown that blight has occasionally occurred in an epidemic form in some of the Western States, but anthracnose never. The blight occurs much less frequently in the West than in the East and year after year is much less of a hazard.

Investigations during several years have developed the fact that western-grown seed gives a much cleaner crop than seed grown in the East, even though it is planted in regions where blight and anthracnose are prevalent.

In view of the fact that these two diseases are seed-borne, and that cleaner seed is being grown in the West, the canners, market gardeners, and those requiring bean seed for planting are advised to procure if possible seed grown in the Western States. In spite of the fact that blight sometimes occurs in some of the Western States, it is less prevalent there than in the East.

Information on the condition of the crop with respect to blight and anthracnose can usually be obtained from the agricultural colleges and experiment stations in the different States.

L. L. Harter, *Bureau of Plant Industry.*

selection and corrective matings on a basis of the production of sire and dam rather than on individual excellence of each parent.

C. G. POTTS, *Bureau of Animal Industry.*

SNAP-BEAN Seed Grown in West is Relatively Free of Blight and Anthracnose

The two most important diseases of beans, blight and anthracnose, are both seed-borne. If infected seed be planted and the weather conditions are at all favorable, the young seedlings may develop one or both of these diseases. From such seedlings the disease may spread to other plants and cause heavy losses to the crop. Blight occurs practically every year in most sections of the United States east of the Rocky Mountains, and to some extent in the Intermountain States of Colorado, Utah, Montana, and Wyoming, and to a very limited extent in Idaho. It rarely if ever occurs in California. Anthracnose is not so general in its distribution, being restricted largely to regions east of the Mississippi River. It is seldom found in Colorado or in any of the States farther west, and when it does occur it is never so prevalent as to be of consequence. Anthracnose occurs only in regions and during seasons having considerable rainfall and where the nights are cool, which explains why it may be present in some seasons and entirely absent in others.

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L. L. HARTER, *Bureau of Plant Industry.*

SNOW Removal on Farm Roads Easily Effected With Simple Equipment All of the main roads and a great many feeder roads in the farming regions are now kept free of snow throughout the winter, according to reports of States in the snow area. Many farmers do not live directly on such roads and must clear their own outlets if they wish to use the highways during the snow season.

Few farms are without a truck or tractor which can be used in clearing snow from farm roads. A snowplow of low cost can be purchased or made and mounted on the machine by a simple attachment. Snow 12 or 15 inches deep can be cleared by a truck at an average speed of 12 to 15 miles an hour while a tractor can move snow while traveling at its maximum normal speed.

Plows of the straight-blade type or V-shape type can be used. The V-type plow is considered by many as more serviceable in opening the initial cut, while the straight-blade plow is believed better in widening work. The V-type plow is difficult to build because of its curved or concave surfaces, and, therefore should be purchased, but the straight-blade plow can be built locally either from wood or metal. Either plow should be between 12 and 15 inches high.

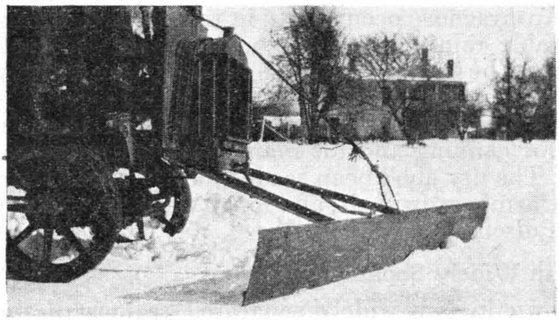

FIGURE 127.—The improvised snowplow in working position

Figure 127 shows a homemade snowplow made of scrap steel and attached to a truck by a bolt through the angle iron of the body frame on each side of the truck, the bolts arranged to act as hinges. One end of a cable is attached to the plow blade and the other end fastened to a light set of chain blocks attached to the truck body. With this arrangment the plow blade can be suspended about 1 inch above the surface being cleared. Such plows are very serviceable when mounted on trucks or tractors, and in some instances have been used on automobiles.

Two Methods of Snow Clearing

Variable snowfall conditions and differences in personal judgment have resulted in different procedures in snow removal. One method is to start work shortly after the storm commences and to continue moving snow until the snowfall stops and the road is cleared. Another method is to delay operation during the greatest intensity of the storm and then to commence snow removal. An advantage of the first method is that deep snow is not permitted to accumulate; but working while the storm is raging is generally hard on the operator, and if the wind is blowing there may be drifting on the cleared roadway. If the clearing is delayed until the storm is over, the removal should be started before the snow has become hard by settling, packing by traffic, or by freezing. At the beginning of the snow season the area cleared should be made sufficiently wide to provide room for the storage of snow from later storms.

The equipment described is capable of displacing newly fallen snow several inches deep and Weather Bureau records show that except in mountainous regions snow seldom falls to depths greater than 9 inches even in the heavy snowfall area of the country. Disregarding snowfall less than 2 inches deep, the greater number of storms deposit snow between 2 and 5 inches deep, with snowfalls 5 to 7 inches deep comparatively infrequent. If snow lies as it falls, little effort is necessary in its removal. But snowfall is usually accompanied or followed by high winds which buffet the snow crystals about, and where obstacles are encountered, drifts are formed. Obstacles break the force of the wind and reduce its velocity. Pockets of comparatively still air are formed to the lee of the obstacles. These pockets permit the snowflakes to fall and create deep drifts which at times are difficult to handle. Obstacles close to the road may cause drifting on the surface while those at some distance to windward may give protection by collecting the loose and drifting snow. Hedges near the road, tight or partly tight fences or gates, standing weeds, and other vegetation often produce drifting. Figures 128 and 129 show slight drifting resulting from weed growth and a farm gate. The drifts shown are not troublesome, but the views plainly illustrate the theory of drift formation.

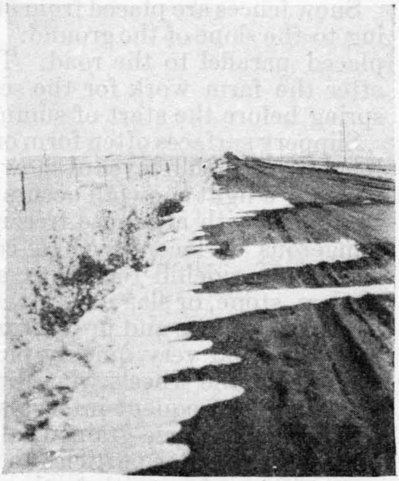

FIGURE 128.—Minor drifting conditions caused by standing weeds

Many Causes of Drifts May Be Removed

In preparing a farm road or lane for the winter, all causes of drifts should be eliminated where possible, or if necessary, artificial windbreaks established. A study of the location should be made and where snow usually piles up, all weeds and other vegetation should be cut and removed from the vicinity and all obstructing board fences and gates should be dismantled at least for the snow season.

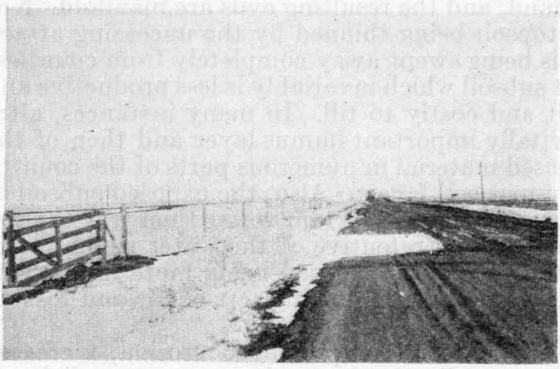

FIGURE 129.—Slight drifting caused by a gate

Where artificial preventive measures are adopted, structures should be so placed as to form eddies on the windward side of the road at a sufficient distance to permit the blowing snow to be deposited between the structure and the road. Such structures are called snow fences

and are built of various materials and of many designs. One type consists of woven-wire pickets, hung on light iron posts which are driven into the ground. A row of evergreen saplings is often adequate protection. The saplings are cut and the sharpened ends inserted in the ground before it freezes.

Snow fences are placed from 50 to 150 feet away from the road according to the slope of the ground. For convenience, the fences are usually placed parallel to the road. The fences can be installed in the fall after the farm work for the season is ended, and dismantled in the spring before the start of summer activities.

Slippery surfaces often form on road surfaces which have been cleared by plows. A thin layer of snow is left on the traveled way by the snowplow, or a light snowfall occurs and the compression caused by traffic, combined with alternate freezing and thawing, results in an icy and dangerous surface. Such a condition is particularly dangerous at curves, on sidehill roadways, and on steep grades. Spreading sand, cinders, stone, or slag chips over the slippery areas is helpful in roughening the surface and preventing skidding. However, it is often found that the wind very quickly blows the material off the roadway or it slides with the wheels when brakes are applied, making replacement necessary at frequent intervals. To overcome such conditions, small quantities of coarse-grained salt can be mixed with the grit. The salt causes the angular particles to penetrate the icy formation, providing a nonskid surface with lasting qualities. Granular material for such use should be protected from moisture and freezing so that it can be readily spread when needed.

H. G. McKelvey, *Bureau of Public Roads.*

SOIL-EROSION Problem Under Investigation in National Control Program Erosional wastage of soil and excessive loss of rain water from unprotected cultivated slopes and from overgrazed as well as rodent-infested ranges and pastures have come to be recognized as American economic problems of grave national importance. The two processes of wastage go hand in hand, and the resulting evils are manifold. Not only is the productive topsoil being thinned by the unceasing attack of run-off water, but it is being swept away completely from countless slopes, leaving behind it subsoil which invariably is less productive and usually is more difficult and costly to till. In many instances, after the washing off of this vitally important humus layer and then of the layers beneath, the exposed material in numerous parts of the country erodes faster than the upper soil layers. Also, the exposed subsoil of many types of land is less absorptive of rain water than was the soil removed by washing, and is less retentive of the water which is absorbed, the clayey material so often exposed being more impervious when wet and more susceptible to hardening, cracking, and loss of moisture on drying.

In many localities, as the result of prolonged erosion, increased amounts of solid soil matter, dissolved constituents, suspended colloids, and water are being swept into the valleys and into stream channels, drainage and irrigation canals and ditches, reservoirs, lakes, and harbors. Lower slopes and alluvial plains are being covered on a large scale by soil started toward the sea, but stranded somewhere en route.

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The coarser of these sediments are injuring fields, meadows, woodlands, and protective brush and grass-covered areas. Frequently, they consist of sand and gravel having either no crop-producing value or a tremendously reduced crop-producing value as compared with the soil buried by them. Moreover, the richer deposits of erosional débris frequently are dropped over the flood plains of streams, in depressions and on lower slopes where the land is already deep and rich, needing no additional soil material.

With the clogging of stream channels, formerly cultivable fields are made uncultivable or useless by reason of the increased frequency and duration of overflows. Indeed, some millions of acres of formerly tilled stream-bottom land have thus been converted into marshland and near-marshland of small value.

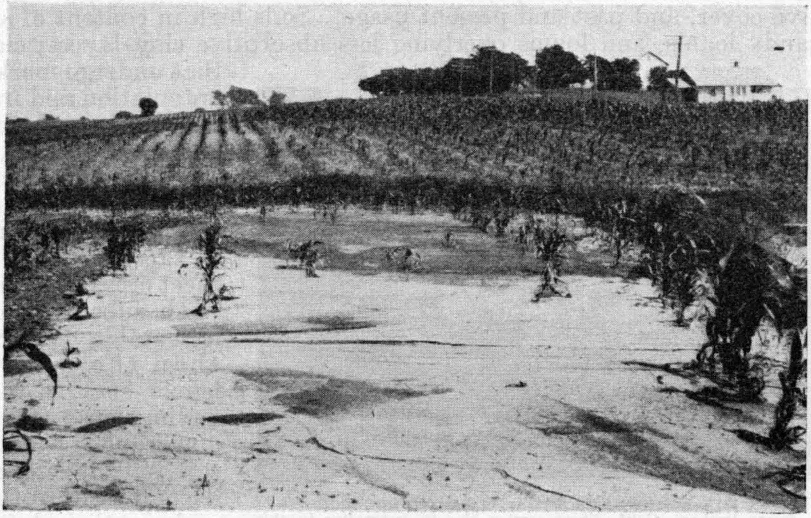

FIGURE 130.—In left background, exceedingly poor corn on stiff clay subsoil of Shelby loam, from which the productive topsoil has been entirely removed by sheet erosion. Foreground shows corn buried by products of erosion in a depression that needed no additional soil material. Corn Belt, northern Missouri

Gullying Causes Added Damage

In its effects on agricultural and pastoral lands, the maleficence of erosion over many millions of acres does not stop merely with the planing off of the upper soil layers, changing vast areas from productive mellow loams, silt loams, and sandy loams to relatively unproductive, intractable clays and clay loams (fig. 130); but goes on to the point of ruining valuable lands by gullying, even destroying them so far as cultivation is concerned. This insidious dissection proceeds with such rapidity in some of the more vulnerable regions of the country that control measures scarcely come within the scope of practical farm operation, especially where procrastination has permitted the gullies to dig deeply into the less stable substrata characterizing many types of soil. On some steeply sloping lands, gullies cut down to bedrock within four or five years after the removal of the virgin cover of timber, grass, or chaparral. Observation and surveys indicate that erosion, accelerated by the intervention of man's agricultural and livestock operations, is affecting not less than 75 per cent of all the land

in cultivation in the United States; and that impoverishing washing, with its attending diminution of the growth of nutritious grazing plants, is affecting between 75 and 90 per cent of the western ranges and a considerable part of the pastures and ranges of the more humid regions. The greater part of this is sheet erosion, which takes a part of the topsoil whenever there is rain enough to cause water to run downhill. Some 17,500,000 acres, at least, of formerly cultivated land in this country have been essentially ruined by gullying, and between 4,000,000 and 5,000,000 acres of alluvial land have practically been despoiled by overwash and increased swampiness resulting from the clogging of stream channels with eroded matter, according to surveys and observations.

The damage of erosion varies greatly, as a matter of course, because of differences in soil, slope, character and amount of rainfall, vegetative cover, and past and present usage. Soils high in content of silt, sandy loams, and loams overlying less absorptive clay layers; clays that undergo marked granulation and fragmentation on drying; and practically all soils of low organic-matter content are especially susceptible to rapid wastage by sheet erosion. Soils with substrata of a less stable character than the overlying layers, such as those having loose, sandy, and gravelly beds and soft, silty layers, and decomposed (rotten) rock in their lower depths, suffer more disastrously from deep-going and rapidly extending gullies than do those types having clay and silty layers of good permeability beneath their upper layers. Soils with impervious sublayers (fig. 131) are far more erosive than those with permeable substrata, that is, where the lower beds do not consist of excessively fragile materials, such as melt away in contact with flowing water somewhat in the manner of sugar. The steeper areas, of course, are usually more erosive, where the soil and soil treatment are comparable, as are, also, the less densely vegetated areas and soils kept loose at the surface by shallow cultivation and excessive trampling of stock. There are exceptions to these general characterizations, but they are not important.

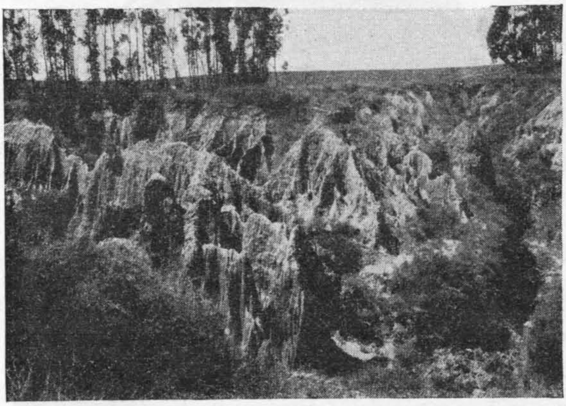

FIGURE 131.—Recently formed gully in bean district southeast of Santa Barbara, Calif. Sheet erosion also is destructive in this region

Plans for Experimentation

The wide differences in susceptibility to destructive washing, due to such variables as those referred to and, in some instances, to the manner in which erosion proceeds (erosion types), necessitate the use of various control measures in attempts to slow down or control the washing. Regions of heavy rainfall characterized by hard showers are likely to call for control measures which may or may not prove

practicable when applied to other regions where the total precipitation is lighter and the rains fall more gently. Erosion by melting snow may not necessarily call for precisely the same means of control as that caused by torrential rainfall.

Where the primary object is to conserve water, still different methods of procedure may be required. Where wind is the chief factor or a markedly important factor in soil removal, yet other methods, such as vegetative windbreaks or fences placed at right angles to the prevailing direction of wind may be required. The effects of gravitational creep, sliding, and soil fragmentation may also call for special control measures. Widely trenching gullies with caving walls, such as characterize soils having loose or soft substrata, require different types of control dams from those required by the V-shaped gulleys which characteristically form in stiff, impermeable clays. Areas subject to rill washing, as distinguished from the more even plantation effects of sheet erosion, seemingly can not be controlled by precisely the same methods as those employed in handling the latter type of washing.

Many Different Measures Necessary

Accordingly, the problem of erosion control and water conservation is not one in which a few simple methods of attack are likely to give widespread results of a satisfactory nature. Indeed, the process is so varied from place to place, because of natural and induced variables, that any effective control obviously will require the use of many different measures. So little attention has been devoted to the problem of land impairment by excessive washing, even though it doubtless exceeds the impairment caused by all the other agencies (of human intervention) affecting soil productivity, that we stand to-day essentially at the threshold of endeavor toward clear understanding of erosional processes and toward development of practical methods of erosion control applicable to the multitude of factors affecting the problem—such factors as soil, climate, topography, vegetation, and land usage. Until recently, quantitative data dealing with erosion and run-off, as affected by these variables, were almost completely lacking. Even now, little is known either as to the rate or type of erosion for most soils, particularly as they occur on different slopes, under different cropping systems. These fundamental data are vitally essential in connection with any sound understanding of the processes involved and with any certainty of procedure in the matter of control measures.

It was not until recently that unnatural or abnormal erosion, as distinguished from the much slower and less vicious soil washing which goes on under natural or normal conditions of ground cover and soil structure, was clearly defined. Broadly speaking, the former type of washing, that is, man-induced or man-accentuated erosion, was looked upon, until lately, as belonging to the natural order of erosional activities. As a matter of emphasis, it may not, perhaps, be amiss to repeat what has already been inferred, namely, that the national program of soil and water conservation, with which this article is concerned, relates primarily to the abnormal phase of soil erosion (fig. 132)—that which results from the activities of man and his domestic animals in breaking down natural soil conditions and stabilizers through the complete or excessive removal of vegetation and the disruption or destruction of the normal or natural soil structure by cul-

tivation, trampling, and other means. And, too, it may be well to emphasize the point that this national program is concerned chiefly with soil and water conservation, rather than with reclamation of areas already despoiled; although, of course, efforts will be made to determine the cost and feasibility of reclaiming such devastated lands.

Methods of Control

Fortunately, experiments aimed at determining the principles underlying soil-erosion processes will, in a considerable degree, reveal, concomitantly, methods of land use which are likely to prove most effective in slowing down excessive soil losses by washing. In other words, the methods of research employed are likely to be, necessarily, demonstrational as well as investigational in character, at least in a considerable number of instances.

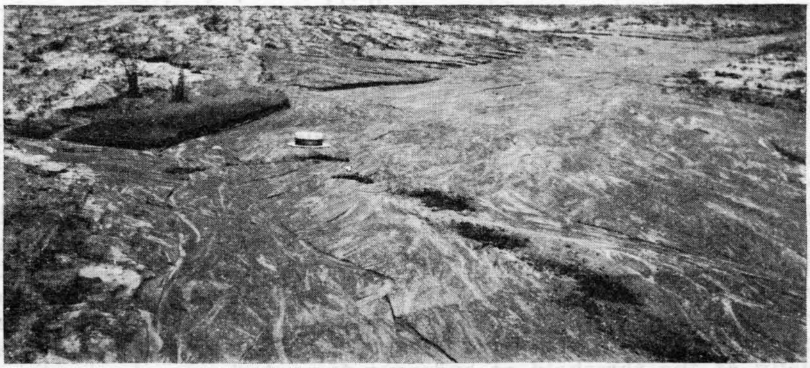

FIGURE 132.—Terrific sheet erosion in Texas black-land cotton field caused by one rain, on May 10, 1930. The cotton was up at the time of this rain, but most of it was washed out. The loss of soil by this one rain (from the same soil and slope as in this field) at the near-by Temple Experiment Station, as actually measured, amounted to 23 tons per acre

From what has been said in regard to the variables of erosion, the investigations manifestly must be carried out on a regional basis, that is, on the basis of the major agricultural soils or soil groups of the country and the major climatic zones. The subordinate variables, such as slope and condition of the soil as affected by different methods of use, must, of course, be given due consideration. The latter, though varying widely within narrow limits, may be classed as local variables, rather than regional, since they may affect most of the regions in more or less the same manner though not necessarily in the same degree.

The major problems as affected by these variables will be attacked first, according to the national program of soil and water conservation as at present outlined, and under as nearly average or representative conditions for the more important regions of distress as may be scientifically practicable. Naturally, the soil saving will be emphasized in those more humid regions where soil losses are of more importance to the users of land than are water losses. Conversely, the saving of water will be given most consideration in those dry regions where the amount of rainfall loss by run-off frequently determines the failure or success of an agricultural enterprise. Some modifications of this general plan of attack may be necessary in those relatively dry regions where soil shifting by wind is of greater concern to the farmer than are losses of water and soil in the run-off.

Outline of the National Program

The national plan for soil and water conservation calls for the establishment of experiment stations in more than 20 major regions throughout the country. (Fig. 133.) Figure 133, however, does not show the location of the experimental investigations being carried on in this connection by the Forest Service on the grazing and forestry lands, but only those pertaining to the farm lands. At these stations every promising, practical means of slowing down excessive run-off and wash-off, such as terracing, building inexpensive dams, crop rotations, strip cropping with and without terraces, subsoiling, strip subsoiling, surface cupping, and the use of living dams and soil-holding vines and grasses, is to be thoroughly tested on a field scale.

The program of investigations as outlined by those who have critically studied the numerous variables and objectives involved, comprises investigations in the fields of soil science, agricultural engineering, and

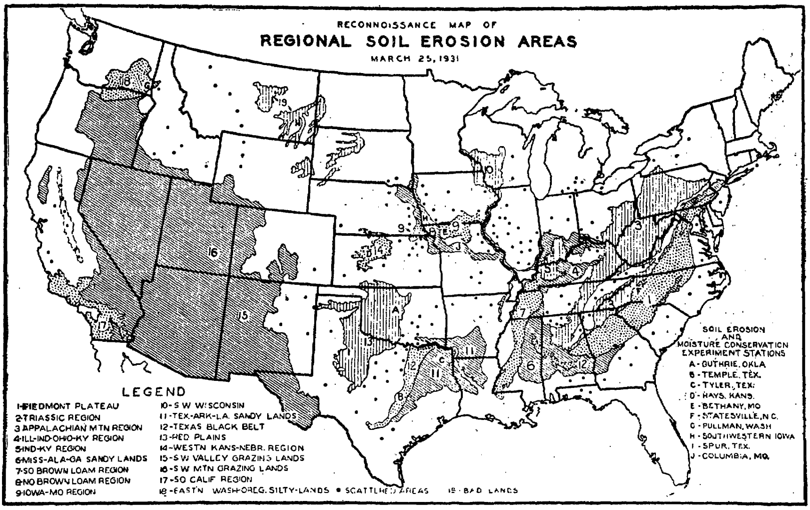

FIGURE 133.—Map showing regional soil erosion areas in the United States, March 25, 1931

forestry. It is impractical, in fact impossible, to draw sharp lines of separation between the studies in these different branches, and the program has been arranged on the basis that specialists in each field shall contribute, cooperatively, the fullest possible measure of technical and practical help. Each of the various problems will be investigated from as many angles as may be necessary to a clear understanding of the processes involved in the removal of soil by flowing water and in the control of the flow to prevent erosion and to induce absorption of the water by the soil.

Owing to space limitations, it is impossible to enumerate here the many experiments being carried on at the eight experiment stations now in operation. The starting points of various experiments are to be process studies, quantitative measurements, and preventive measures as influenced by soil, degree of slope, length of slope, crop, cropping system, vegetation, amount and character of rainfall, seasonal conditions, tillage methods, grazing, burning, lumbering, and use of fertilizers.

Surveys

Necessary detailed and reconnaissance surveys are to be made of small plats, large fields, farms, drainage basins, and valley areas receiving deposits of erosional débris from crop lands, grazing and timber lands, and protection areas or areas under protection for the purpose of regulating stream flow, prevention of excessive silting of reservoirs, lakes, and harbors.

Education and Extension Activities

It is proposed to carry on programs of education and extension work in order to arouse land users, the Nation, States, counties, and business men to the seriousness of the problem of erosion, its meaning and cost; to point out the necessity for employing practical methods of control, emphasizing the fact that erosion is a business problem which must be solved now, and not one that can be put off for future generations to take care of; and to carry direct to the farmers those practical results worked out at the regional soil-erosion and moisture-conservation experiment stations which have been proved to be applicable to their local conditions. The problem of conserving more of the rainfall by causing more of it to sink into the ground where it falls and by diverting and spreading the run-off so as to apply it economically to lower-lying areas according to the water needs of such areas, will be emphasized, and any experimental results of proved practical value in this connection will be carried to the users of the lands in each region. This problem of saving more of the rainfall, of course, applies chiefly to areas characterized by low precipitation, particularly to farms and ranges within and to the west of the Great Plains.

Dissemination of the facts relating to the causal and identifiable aspects of erosion, as well as to the cost of erosion in general and specific terms of land impoverished or destroyed, and the carrying of experimental results pertaining to practical methods of control and prevention directly to the land users concerned, can probably best be accomplished through the medium of the Federal and State extension and information services, the State colleges of agriculture and experiment stations; by the encouragement of visits to the erosion and moisture conservation experiment stations on the part of farmers, business men, teachers, and students; by publication and wide distribution of departmental and State bulletins, circulars, and progress reports; by newspaper, magazine, and farm-journal articles; and by illustrated lectures.

Cost of Preventive Measures to be Studied

It is proposed under the national program of soil and water conservation to determine the efficacy, practicability, and cost of all promising means of prevention, control, and reduction of erosion and excessive run-off of rainwater, and to carry the results to those users of the land according to the specific needs and adaptabilities of their soils. Obviously, it is not going to be possible to work out all the details of such a comprehensive program at once. The various research projects and required experimental installations will be taken up in an orderly manner, in accordance with their apparent importance, when and so far as circumstances permit. This is a new field of research; in order

to carry it ahead in the most efficient manner, new methods of procedure and technical equipment must be worked out.

It will be readily recognized by all who look searchingly into the problem of erosion that it embraces so many variables, so intricately interdependent, that time, patience, and a high degree of technical efficiency will be required to solve the problem in all of its varied ramifications. That this will be accomplished wholly or in a large degree is indicated by the good progress already made at the eight established stations.

H. H. Bennett, *Bureau of Chemistry and Soils.*

STATE Experiment Stations Win Useful Results in Agricultural Engineering

The investigations in agricultural engineering at the State agricultural experiment stations have been built consistently around the problems of primary importance to the agriculture of each State, and have undergone a gradual but sound development during recent years. As progress has been made and a better understanding gained of the field and technic of these investigations, the application of engineering principles to agricultural practices has been accomplished to an extent which has considerably increased efficiency in several lines of production. High standards of scientific investigation in this field have been identical with high standards of practical service, and results which are of considerable practical utility to the agriculture of the different States have been secured.

These investigations have aligned themselves into certain general fields. These fields include farm power and machinery, farm structures, land reclamation and improvement, and rural electrification.

Perhaps the biggest returns in increased economy in production and greater efficiency per agricultural worker have been realized from the investigations in the power and machinery field. The items of power and labor in agricultural production are tremendous and have been estimated as varying in cost from 45 to 65 per cent of the total cost of production of the more important crops. The development of the important specific details of mechanical methods and equipment for seedbed preparation, planting, cultivation, and harvesting especially, has been productive of cost-saving improvements. Thus important returns in the form of more efficient and labor-saving machinery and methods for the preparation and cultivation of cotton soils have been realized from the studies of the mechanics of tillage at the Alabama Agricultural Experiment Station, for example. Similar results have been obtained with reference to the preparation and cultivation of soils for the corn crop by several of the Corn Belt stations. Equipment and methods which permit the economical and proper planting and fertilization of the corn and cotton crops in one mechanical operation also have been developed. They save time and labor and result in a better crop stand.

Efficient Use of Traction

Much also has been accomplished in the more efficient use of animals for draft power and in the development of power draft machines and their adaptation to medium-sized farms. Practical devices have been produced wherewith the maximum draft power from animals of different numbers and weights can be secured and most efficiently used, and

to carry it ahead in the most efficient manner, new methods of procedure and technical equipment must be worked out.

It will be readily recognized by all who look searchingly into the problem of erosion that it embraces so many variables, so intricately interdependent, that time, patience, and a high degree of technical efficiency will be required to solve the problem in all of its varied ramifications. That this will be accomplished wholly or in a large degree is indicated by the good progress already made at the eight established stations.

H. H. BENNETT, *Bureau of Chemistry and Soils.*

STATE Experiment Stations Win Useful Results in Agricultural Engineering

The investigations in agricultural engineering at the State agricultural experiment stations have been built consistently around the problems of primary importance to the agriculture of each State, and have undergone a gradual but sound development during recent years. As progress has been made and a better understanding gained of the field and technic of these investigations, the application of engineering principles to agricultural practices has been accomplished to an extent which has considerably increased efficiency in several lines of production. High standards of scientific investigation in this field have been identical with high standards of practical service, and results which are of considerable practical utility to the agriculture of the different States have been secured.

These investigations have aligned themselves into certain general fields. These fields include farm power and machinery, farm structures, land reclamation and improvement, and rural electrification.

Perhaps the biggest returns in increased economy in production and greater efficiency per agricultural worker have been realized from the investigations in the power and machinery field. The items of power and labor in agricultural production are tremendous and have been estimated as varying in cost from 45 to 65 per cent of the total cost of production of the more important crops. The development of the important specific details of mechanical methods and equipment for seedbed preparation, planting, cultivation, and harvesting especially, has been productive of cost-saving improvements. Thus important returns in the form of more efficient and labor-saving machinery and methods for the preparation and cultivation of cotton soils have been realized from the studies of the mechanics of tillage at the Alabama Agricultural Experiment Station, for example. Similar results have been obtained with reference to the preparation and cultivation of soils for the corn crop by several of the Corn Belt stations. Equipment and methods which permit the economical and proper planting and fertilization of the corn and cotton crops in one mechanical operation also have been developed. They save time and labor and result in a better crop stand.

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Much also has been accomplished in the more efficient use of animals for draft power and in the development of power draft machines and their adaptation to medium-sized farms. Practical devices have been produced wherewith the maximum draft power from animals of different numbers and weights can be secured and most efficiently used, and

these devices have been adapted economically to different draft operations on the farm.

The tractor in its earlier stages was frequently neither efficiently nor economically adaptable to the peculiar and sometimes very severe conditions of agricultural service, and it became necessary to modify and develop it in some of its more important operations, such as driving, steering, traction, and lubrication. As a result it is becoming a very useful farm machine for both belt and draft power purposes, especially in the general-purpose types. It is now possible, for example, to use tractors in field operations on some of the more difficult soils without the large losses of power through wheel slippage previously experienced. This has resulted from the development of drive-wheel design, notably by the Alabama station. The development and modification of tractor engines, especially at the California station, resulting in dust elimination and more efficient bearing lubrication, have materially reduced the cost of maintaining tractors used in farming operations. Better adaptation of the tractor to definite sizes and systems of farming has been accomplished to good advantage, notably by the Montana station. As a whole the tractor has been developed into a time and labor saving machine which, when properly supplemented by animal power, is becoming useful and profitable in many activities of both general and specialized types of farming.

Harvesting Losses Reduced

Developments of a similar practical character have taken place in harvesting and threshing machinery. The older methods were wasteful of time, labor, power, and grain. Much was accomplished along cost-saving lines by the practical combination of the grain harvesting and threshing operations, although the losses of grain were still high. The further development of equipment and methods by such stations as those in California, Illinois, Minnesota, North Dakota, and Pennsylvania, for example, resulted in material reduction of previous large losses of grain and increased economy in power and labor. Progress also has been made in the artificial drying of the green combined grain until it has become possible in several localities to place a product of satisfactory quality in storage after combining.

Frequent large losses of hay and other forage crops through inclement weather, especially in the more humid regions, also have prompted the stations to investigate the possibility of artificially curing such crops. As a result considerable success has been attained, notably by the Louisiana station, in developing equipment and methods for artificially curing such forage crops as alfalfa, soybeans, and the like, and at the same time maintaining their superior quality.

In the field of farm structures, numerous practical developments have resulted not only in structural soundness, fireproofness, durability, and economy of farm buildings but in their internal arrangement to produce optimum conditions for the storage of fruits, vegetables, and other crops, and for the housing of dairy and other livestock and poultry. Thus durable, economical, and sanitary dairy and livestock structures have been developed to meet the needs of agriculture in several of the States, and poultry structures have been improved along sanitary and cost-saving lines which also have favored optimum production. Much has been done toward the development of economical and effective grain storages, notably by the Kansas station, and the

way toward improved apple storages has been pointed in several of the leading apple-producing States.

The station investigations relating to land reclamation and improvement have been equally productive of useful results. Important among the achievements in this line have been the establishment of practical and economical methods of stump burning and removal, notably by the California, Oregon, Washington, and Minnesota stations. The use of explosives for clearing land of stumps and bowlders and for the quick and economical excavation of drainage channels in swampy soils has also been developed to an eminent degree, especially by the Michigan and Alabama stations.

More Effective Irrigation Methods

The older methods of irrigation were frequently wasteful of both labor and water, and the stations in the arid and semiarid States have expended considerable effort to introduce greater economy and effectiveness into these practices. Much more economical and effective methods of using water in irrigation agriculture are now available, and considerable equipment for its precise measurement and control has been provided.

In the past, soil-erosion prevention measures were largely of a speculative character and frequently were expensive and not very effective or permanent. Considerable improvement has been made and much engineering precision has been introduced into methods of terracing, soil-saving dam construction, gully obstructing, and similar measures for the control of soil erosion and the conservation of storm run-off water, especially by the Texas, Oklahoma, and Missouri stations. The cost of these measures on the acre basis has been brought down to a very reasonable amount.

The somewhat recent widespread movement to introduce electricity into agricultural operations has prompted several of the stations to undertake investigations along specific lines, and already much information of practical utility has been secured. For example, electrical feed grinding, silage cutting, and other forage-processing methods have been developed along cost-saving lines, and the electrical brooding of young chickens has reached a practical stage in several States. Electrical refrigeration and milk processing have been developed along lines of utility and economy, notably by the New Hampshire station, and dairy-utensil sterilization, poultry-house lighting, and milking are other important features of farming to which electricity has been applied in a useful and profitable manner. These investigations have the well-established background of the electrical industry at their disposal and much progress has been made in lightening several agricultural burdens.

Thus the agricultural-engineering investigations at the experiment stations have established their place and demonstrated their worth in the agricultural programs of the different States. They have supplied numerous mechanical and structural means of securing higher-quality farm products with less labor and at lower costs. They have thereby assisted materially in laying the foundations of a civilization which no longer recognizes or tolerates the agricultural burdens and drudgery of preceding generations, and which considers the farm as an industrial unit as well as a home.

ROBERT W. TRULLINGER, *Office of Experiment Stations.*

STINKING-SMUT Control Through Seed Treatment Urged by Extension Men Estimates of field losses and market discounts indicate that during the past 10 years there has been a general increase in stinking smut of wheat in the United States. At the present time the losses for the country as a whole are apparently on the downward trend, but from 1922 to 1926 they were decidedly upward. There are certain wheat areas, such as the spring-wheat States and the intermountain area of Utah and Idaho, where the losses still seem to be tending upward.

One of the most important reasons for the increase and continued severity of stinking smut is the appearance of new physiological or supervirulent forms of the smut fungus which have attacked more or less resistant varieties of wheat, causing heavy loss. Some of these distinct forms or races have been known in other countries for several years, and it is suspected that the great exchanges of seed wheat during and following the World War may have brought about their introduction and subsequent increase and spread. Recently, in the spring-wheat area, durum wheat, which prior to 1925 showed practically no smut, has become very badly affected. Also the popular spring wheat Marquis, hitherto highly resistant, is now showing increasing amounts of smut. There is every indication that growers now have to deal with several forms of smut instead of with two, as was formerly supposed, and that the problem of control has been made more difficult. Adjustments in farm practices and changes of varieties become necessary. Naturally these adjustments and changes come about slowly.

FIGURE 134.—Aside from providing information needed as a basis for control work, the wheat-smut survey offers an excellent opportunity for personal contact with growers. The symptoms and losses can be shown to them and preventive measures explained

In an effort to throw further light on the reasons for the continued prevalence of smut in spring wheat, a survey (fig. 134) was conducted in 1930 covering 17 counties in 4 States. The principal objects were to find out how extensively seed treatment was being practiced; to determine more accurately the results being obtained by seed treatment; and to study the methods being followed. It was found that seed treatment was being used by only about two-thirds of the farmers in the area covered. It was further determined that satisfactory results were not being obtained by many of those who practiced seed treatment. For instance, in the 434 fields of treated seed there was considerable smut, averaging 2 per cent, while in the 270 untreated fields there was an average of 4 per cent smut.

Faulty Methods Largely Responsible

A study of the reasons for failure to control led to the conclusion that faulty methods were largely responsible. In many cases the seed had not been thoroughly cleaned to remove smut balls. Also, the disinfectants used, either liquid or dust, had not always been thoroughly or properly applied. The result of the study of the methods bore out the conclusions reached earlier through experimentation that the most effective preventives were copper carbonate, either the 50 or 20 per cent grades, formaldehyde used according to the soaking and skimming method, and organic mercury dusts, all applied with efficient homemade or commercial machines. The same chemicals applied by sprinkling and shoveling methods were in general unsatisfactory. To control smut, it is not only necessary for more farmers to clean and treat their seed, but for those who do treat it to perform better and more effective work.

With the increase of stinking smut in recent years there has been an extension of research and control activities by the States and by the United States Department of Agriculture. Special literature has been prepared and distributed. County agents have conducted many demonstrations showing methods of treatment and the results. Several railroads have run demonstration trains emphasizing smut control. More elevator operators have become interested and have cooperated by making treating machines and chemicals available, and by adopting the practice of buying wheat on a quality and grade basis with discounts for smut. Community seed cleaning and treating outfits, either stationary or portable, have been operated in many counties, in most cases with good results. (Fig. 135.)

TREATMENT	NO. FIELDS	AVERAGE PER CENT SMUT
HOT WATER	2	0
BLUE VITRIOL	1	0
50% COPPER CARBONATE, MACHINE	11	0.3
20% COPPER CARBONATE, MACHINE	9	0.5
FORMALDEHYDE, MACHINE	93	0.9
20% COPPER CARBONATE, HOME MIXER	33	1.1
CERESAN, MACHINE	17	1.3
CERESAN, SHOVEL	7	1.3
FORMALDEHYDE, DIP	20	2.0
FORMALDEHYDE, SPRINKLE	196	2.1
50% COPPER CARBONATE, SHOVEL	6	3.2
FORMALDEHYDE, SPRAY	6	4.4
20% COPPER CARBONATE, SHOVEL	24	4.6
20% COPPER CARBONATE, MIX IN DRILL	1	8.2
NO TREATMENT	270	4.2
TOTAL	696	

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FIGURE 135.—Relative effectiveness of different methods of treating spring-wheat seed, as shown by a survey in 1930

Some of the best examples of successful operation of portable community cleaning and treating outfits are found in California. In that State the use of copper carbonate has now become a general practice. In 1925 and 1926, 26 and 16 per cent of the cars received on the Los Angeles grain exchange graded smutty. About that time one of the counties started a portable cleaning and treating outfit. In one 20-day period it cleaned and treated for 134 growers, 35,000 bushels of grain, mostly wheat, which represented about four-fifths of the total seed grain used in the county. The average cost for the work was about 6 cents per bushel. Following this successful experience other counties began operating similar outfits and to-day many are being used in the State. A study of the report of the Los Angeles grain exchange for

smutty California wheat being received there shows that in 1929, 7 per cent, and in 1930, 1 per cent of the carloads, were classed as smutty.

Progress in Kansas and Pennsylvania

Kansas and Pennsylvania have each made marked progress in controlling smut during recent years. The former has just completed a 5-year program for wheat improvement which included seed treatment for smut prevention. The use of copper carbonate dust in Kansas has gradually been extended until in 1930 somewhat more than 2,000,000 acres were sown with treated seed. In 1926 the estimated loss in yield from smut was 10 per cent, while in 1930 the estimate was not over 2 per cent. Seed-treatment campaigns in Pennsylvania have

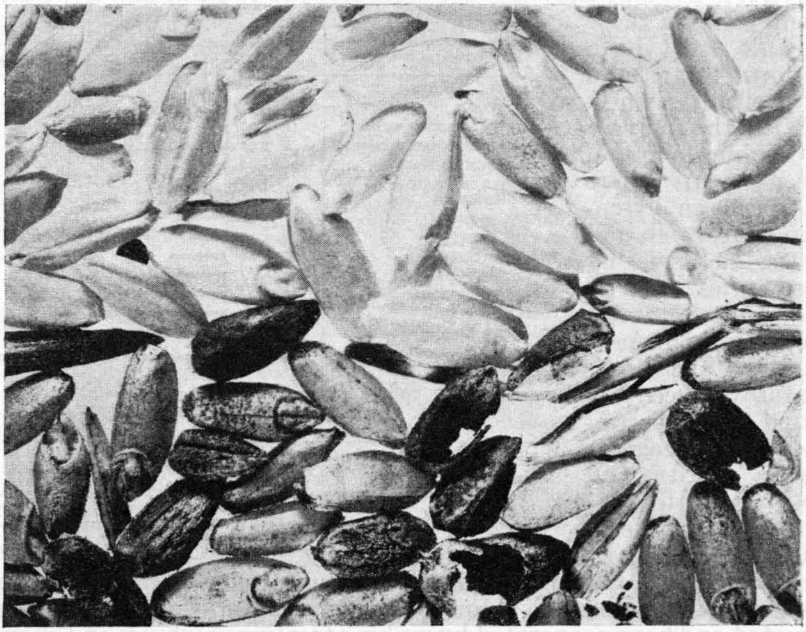

FIGURE 136.—Smutty wheat below, smut-free wheat above. The smutty sample shows both broken and unbroken smut balls and smut spores smeared over the outside of sound kernels. Thorough cleaning to remove smut balls should precede seed treatment

accomplished a gradual reduction in smut from 6 and 7 per cent during 1926 and 1927 to less than 1 per cent in 1930.

In the spring-wheat States the community treating outfit which is proving so satisfactory in California is not so practicable. The wet roads in the spring interfere somewhat with hauling wheat to a central treating plant, or the farm-to-farm operation of a portable outfit. However, there have been several instances of success with community treatment. At Hanley Falls, Minn., for instance, wheat had been very smutty previous to 1928. During that year an elevator manager purchased several seed-treating machines. Some of the smaller ones he rented to farmers at a small daily charge while a large-capacity machine served those who brought in their seed. The results were very striking, for in 1929 no smut was found in the first 20 carloads shipped out. Several spring-wheat counties have made progress in

control as a result of intensive work. Among these, Brown County, S. Dak., stands out prominently. In 1928 Brown County was one of the smuttiest counties in South Dakota, 41.5 per cent of the carload receipts at Minneapolis grading smutty. In the winter of 1928–29 a campaign for control was started with the result that the 1929 crop from the county graded only 17 per cent smutty and in 1930 a still further reduction occurred in spite of the general increase of smut in the entire spring-wheat area.

In the extension work for 1931 greater emphasis was placed on better and more efficient cleaning of seed to remove smut balls and on better and more efficient treating methods. (Fig. 136.) The use of sprinkling and shoveling methods was discouraged and the importance of good machines of the right type was emphasized. Where practical, the use of community cleaning and treating equipment was advised. The control of smut on a large scale is not so easy as one might suppose, and when attempted in a small way often results in failure. Therefore, in States where smut is a real problem, county agents are now being encouraged to put on intensive control campaigns making full use of demonstrations, surveys, meetings, tours, contests, news services, and other recognized extension means and agencies.

R. J. HASKELL, *Extension Service.*

STRAWBERRY-BUD Formation Is Favorably Influenced By Temperature and Light Investigations on the time of fruit-bud formation in strawberries were begun more than 30 years ago by Goff in Wisconsin. He found that such formation began there during September. Since that time other investigators have found that this date is approximately correct for latitudes near to that of Wisconsin. Recent studies, however, have shown that there is considerable difference among the different varieties as regards time when fruit-bud differentiation is first evident and also in regard to the subsequent rate at which development takes place. The Howard 17 in the Eastern States and the Marshall in the Pacific Coast States start forming fruit buds early in September, whereas the Southland in the East and Ettersburg 121 in the Pacific Northwest do not begin until about November 1. The development of the fruit buds of the Missionary seems to proceed much more slowly than in the Dunlap, although both begin fruit-bud differentiation at about the same time.

Some information on the effect of different growing conditions upon fruit-bud development is now available; furthermore, the influence of the drought of 1930 revealed some interesting facts. In Maryland, plants severely weakened by the drought showed no signs of fruit-bud development and produced no berries. The light, late fall rains were not sufficient to start fruit-bud formation, and the crop in the spring of 1931 was very light. A few drought-resisting varieties were vigorous enough to form some fruit buds and to produce a fair crop. In North Carolina the drought also weakened the plants so that fall fruit-bud formation was much less than usual and a light "ground crop" of fruit resulted. However, owing to the mildness of the winter and early spring, fruit-bud formation took place then in all well-rooted plants, and a heavy "crown crop" of fruit resulted.

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Two Peak Periods in South

In the Southern States, from about the Virginia-North Carolina line southward to northern Florida, there are two peak periods in the strawberry season. The first crop, known as the ground crop, is borne on fruit stalks that branch basally; the second, known as the crown crop, is borne on long fruit stalks that branch at a considerable distance from the base. These two peak periods of production are accounted for by the fact that fruit-bud formation takes place under Coastal Plain conditions in North Carolina and southward in autumn, to some extent during the winter, and in spring. The ground crop (called crown crop in Louisiana) develops from fruit buds that form in the fall. The crown crop (called limb crop in Louisiana) develops from fruit buds that form later than those that develop into the ground crop, even as late as April and May while the crop is ripening. The relative time of ripening and the amount of the ground and crown crops depend on the vigor of the plants, especially in the fall, and on the weather conditions during the fall, winter, and spring. Strawberry plants must be vigorous during the fall period in order to produce a large early ground crop. In North Carolina, in many seasons at least, if there is a large early ground crop, the crown crop seems relatively late. In an open winter many of the buds develop until they are caught by freezes and killed; in closed winters the buds are more dormant and the ground crop is large.

The long season of fruit production in Florida seems to be due to the formation of fruit buds going on almost continuously throughout the winter and spring but gradually coming to an end when the summer temperatures become high.

In districts of California just south of San Francisco, fruit is produced from April to December by varieties which in other parts of the United States produce but a single crop. Conditions in these California sections seem favorable to fruit-bud formation in the same way that winter conditions in Florida favor continuous fruit-bud differentiation.

In western Oregon the Marshall variety begins to form fruit buds in the old crowns about September 1. In the same region the Ettersburg 121 variety does not begin to form buds until about November 1, but it continues to grow and develop fruit buds later than the Marshall, the top of which becomes dormant as soon as freezing weather occurs. The Oregon State Experiment Station has found that very large increases in yield result from irrigation of the Marshall, but in many years at least, no increase results from irrigation of the Ettersburg 121. The explanation of this is that much more vigorous plants are produced by summer irrigation of the Marshall, so that more fruit buds can form in September and later. Vigorous growth of the Ettersburg 121 follows the advent of the fall rains, so that extensive fruit-bud formation can take place after November 1.

Runner Production in Spring Varieties

Spring-bearing varieties produce runners and new runner plants when the long daily light periods of summer occur, but when shorter daily light periods prevail in the fall, runner production slows up and fruit-bud formation takes place. In Florida under the short days of winter, fruit-bud formation is continuous and very few runners are produced.

In the California districts fruit buds start forming when the daylight periods of fall become short, and owing to mild weather, fruit buds there continue to form all winter. The spring and summer days in central California are relatively short, as compared with those in Northern States, and in districts near the coast are relatively cool, and fruit-bud formation continues throughout the summer.

Owing to inherent characteristics, everbearing strawberries produce fruit buds only when long daily light periods occur or have just preceded fruit-bud development. In everbearing varieties almost the entire stimulus due to long daily light periods goes into fruit-bud formation. This seems to account for the few runners put out by this type of strawberry. The everbearing strawberries do not succeed under Florida winter conditions; the days are too short there for the growth of the present everbearing varieties.

The effect of temperature upon fruit-bud development is not wholly understood. Under very warm summer conditions no fruit-bud differentiation takes place in ordinary varieties. In the California districts referred to, which are near the coast, the summer temperatures are relatively low and fruit-bud formation and fruit production continue throughout the summer, whereas in the interior valleys the summer temperatures are high and little fruit is produced.

If temperature alone were considered, then moderate temperatures seem most favorable to fruit-bud formation. If the daily light period is considered alone, then light and dark periods of about equal length seem most favorable to some varieties, but a still shorter day light period for other sorts is desirable. In the case of everbearing strawberries, inherent characteristics cause fruit-bud differentiation under long days. Experiments and practice show, therefore, that both day length and temperature affect fruit-bud formation, each variety having a characteristic response to each condition. Lack of moisture also affects fruit-bud formation but indirectly, through weakening the plants, as illustrated above by the drought of 1930, and by the effect of irrigation on the Marshall in Oregon.

GEORGE F. WALDO *and* GEORGE M. DARROW,
Bureau of Plant Industry.

SUGAR-BEET Production Costs Reduced by New Cross-Cultivation Method Lessened returns per ton of sugar beets, caused by the prevailing low price of sugar, make reduction of production costs imperative. This can be accomplished in part by reducing the amount of hand labor required in properly thinning and hoeing the crop. A partial mechanization of some of the hand-labor operations appears to be a logical solution of the problem, especially in view of the very recent experience in cross blocking and cross cultivating beets.

Cross cultivating beets by machinery has recently been tried on a small scale on some of the larger European estates where sugar beets form a basic part of the cropping system. To accomplish this purpose, half of the beet seed is planted in rows in one direction and the other half in the other direction. This enables the grower to cultivate his crop in the two directions of seed planting. This cross-drilling practice, however, has not given satisfactory results, owing to the fact that some of the individual beet plants are left aligned in one row and some in the cross-drilled row, thus giving such offsets as to make it

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quite impossible to cultivate closely to the row because of danger of cutting out some of the beets that are not aligned. This European experience is pertinent, as it answers a question that has been of concern to many of the domestic sugar-beet growers, on the merits of cross drilling versus cross blocking. The question of space allotment per plant as required by the cross-cultivating system has also been given earnest consideration by these European growers, who find it advantageous to plant the beet seed in closer rows than the standard practice in growing sugar beets requires.

Experience in the Humid Area

In the United States, before 1929, cross blocking and cross cultivating of beets were not attempted except in an experimental manner, and then only on a very small scale. These early experiments plainly demonstrated the workability of the practice on fields of good beet stand, although the need for such radical departure from established methods was at that time seriously questioned. As shortage of labor became acute, the industry became willing to make the concessions apparently demanded by this practice. The cross blocking differed from the mechanical blocking which has been successfully used since 1927 in fields of good beet stands as an aid to reduce competitive effects of the unthinned beet plants. In mechanical blocking the space allotment per plant is much less than in cross blocking, since no cross cultivating is attempted.

Cross cultivating of beets was undertaken on a large scale in 1930 in the Iowa, Minnesota, and North Dakota sugar-beet growing areas, by about 500 growers on approximately 10,000 acres of beets. The fields to be cross cultivated were cross blocked with the same cultivator used for later cultivation. In most cases, only fields of excellent beet stands were selected for this purpose. The cultivator, generally a 2-bar tool type, was equipped with disks for cutting the block, and shields were attached to the disks to protect the beets retained in the block from being covered by soil. Duck-feet or V-shaped knives on curved shanks were mounted on the tool bar in such a manner as to eliminate completely weeds and beets growing in the beet row between the blocks of beets which were retained. The additional cultivating tools or attachments required do not add greatly to the cost of the equipment, since they are inexpensive and usually part of the standard equipment. (Fig. 137.)

As a result of this cross blocking, thinning operations were expedited in such a manner that quite generally a twofold output of acreage thinned per day per adult worker was secured, and frequently even higher rates of thinning were reported. This higher rate of thinning is made possible because the cultivation given in two directions eliminates hand blocking and leaves the surface of the soil in such a loosened condition that the laborer can do the thinning without using a hoe. This greater efficiency of hand labor, and the handling of a considerable part of the job of blocking and thinning with local labor, is of great significance as a means of reducing cost of production of sugar beets.

Weeds More Effectively Controlled

After being thinned, the cross-blocked beets were cross cultivated in the same way that a cornfield is handled. As a result of this cross cul-

tivation weeds were controlled more effectively than in fields where cultivation in only one direction was given. On the acreage thus cross cultivated, the subsequent hoeing cost was about $2.50 per acre, as compared with the contract hoeing price of $6 where no cross cultivation was employed.

Since, in the cross-cultivating operations, a different spacing of beets in the row and different distances between the rows are necessary, both being departures from the established practice, a spacing test was conducted at South East Experiment Station at Waseca, Minn., in 1930, to determine the proper space allotment per individual beet plant. This test, which was adequately replicated, indicated that the beet plots in which beets were spaced 18 by 18 inches apart produced very satisfactory yields in comparison with the standard 22 by 12 inch spacing of beets for the southeastern Minnesota area.

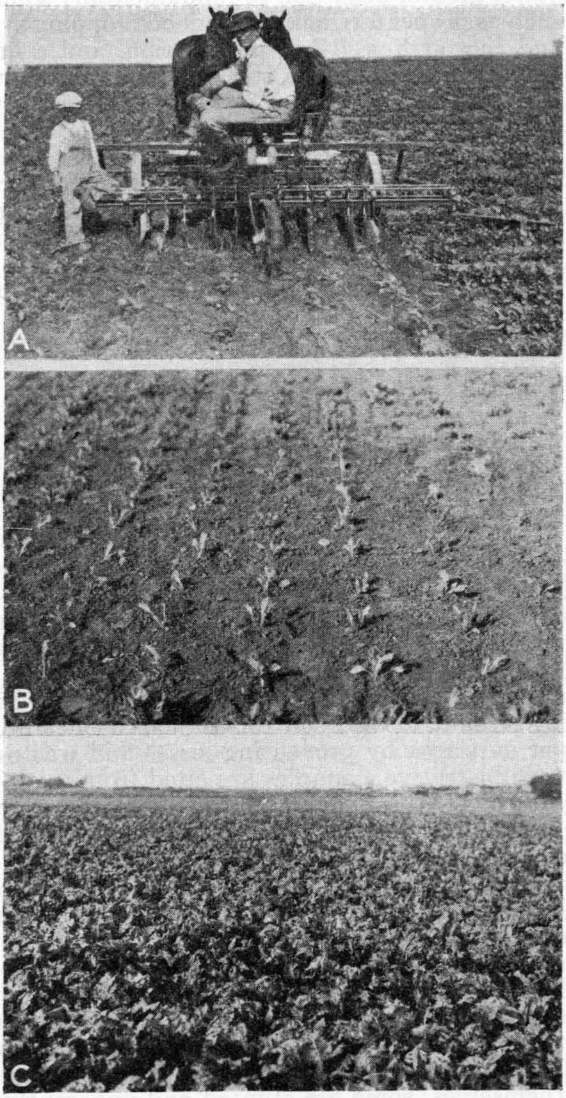

FIGURE 137.—Cross blocking and cross cultivation of sugar beets: A.—Note the arrangement of tools, consisting of disks, shields, and duck feet, and the marker attachment. B.—The same field thinned. Note the square patterns 18 inches by 18 inches, the full stand, the clean condition of the field, and the sturdy growth of the beet plants. C.—The same field at harvest. Note the uniformity of foliage growth and the excellent condition of the field in spite of a protracted period of drought

The question of how far apart the rows should be planted and the distance of spacing beets in the row must necessarily be answered by the available soil moisture supply, whether or not irrigation of the crop is practiced, the soil type and slope, the fertility of the soil, and the equipment available for this work. Where a tractor is available for cross blocking and cross cultivating the rows can be considerably narrower—16 by 16 inches and possibly less—than where heavy draft animals are used for this work.

Cross cultivation of beets seems a logical step in the mechanization of the sugar-beet industry. With proper control, it should develop into a widespread practice. Success with this method, however, requires greater attention to fundamentally sound agricultural practices such as proper fertilization, a good cropping system, fall plowing, early and thorough seed-bed preparation, and a first-class stand of beets. To secure a good stand suitable for cross cultivating, a generous seeding rate, timely seeding in narrower rows, and early cultivation are necessary. The small blocks (2 to 3 inches wide) which are left should be promptly thinned under close supervision, so that all weeds are removed and the strong, sturdy beet plant is retained. To obtain the maximum benefits from weed control, and to produce an effective soil mulch, cultivation of the crop in both directions should be continued as long as necessary. Where due attention is given to these items, a material saving in both ton and acre costs of production of sugar beets should result.

A. W. Skuderna, *Bureau of Plant Industry.*

SUGAR-BEET Production Is Entering New Era As Disease Control Gains

In common with other agricultural crops, the sugar beet is subject to serious losses because of plant diseases. These losses vary somewhat from year to year, but they are annually, in one area or another, a serious handicap to successful and stable crop production. Specific control of sugar-beet diseases has usually not been attempted. Certain general measures, which may collectively be termed good farming practices, have served in the past to minimize losses. With the pressing economic requirement for efficient crop production, more attention is being given to disease-control methods as means of increasing production per unit area by preventing losses and wastes caused by diseases. A few illustrative examples are cited from work of the scientific staff of the Division of Sugar Plant Investigations now in progress.

The blackroot disease of the seedling beet is the most frequent cause of bare, idle spots in the sugar-beet field, and is chiefly responsible for the poor stands obtained in certain eastern areas. Because of attack by parasitic fungi, the young plant may never get above the ground, or if it emerges may "damp off." The fungi that cause this disease are in part seed-borne and in part present in the soil. In combating the blackroot disease, crop rotation, the use of well-drained fields, good seed-bed preparation, seasonably early planting, and prompt cultivation have been found helpful. It is a common observation that the beet plants in the field before thinning show marked differences among themselves; some are stunted and apparently unable to grow, others are sturdy, vigorous plants whose leaves and roots are already rapidly expanding. The healthy plant stands out strongly from its diseased neighbors. The selection of such sturdy plants at thinning time has been shown to give marked improvement in stand, and the effect of this selection has been reflected in the yields. Care at thinning time to insure starting with healthy plants also does much to avoid the rotting of half-grown or mature beets in the field, since much of this rotting seems to trace back to disease contracted in the seedling stage.

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Disinfection of Seed Balls

A new method to supplement these desirable practices seeks to protect the young plant from the invading fungi by coating the seed with a fungicidal dust which disinfects the seed ball and a small zone of soil around the young plant. One of the most successful dust coatings yet found contains a mercury compound as the fungicide and in addition has a small amount of readily available plant food which promotes rapid growth of the young seedling. In the experimental trials, seed-treatment methods have been highly successful in preventing the blackroot disease. Field experiments to adapt seed treatment for commercial use are under way. The field problem is complicated by the massiveness of the infection that sometimes occurs with heavy, poorly drained soils, the different species of fungi involved, and the great variety of conditions encountered in the field tests. The results so far indicate that a simple and fairly inexpensive seed treatment gives excellent stands under conditions where untreated seed gives unprofitable ones.

The sugar-beet nematode has caused serious injury to beets in western beet-growing areas, and the infested acreage is becoming larger each year, because of failure to maintain a safe rotation and owing to the introduction of infested soil into clean fields. Tests over a number of years have shown that for almost all western areas a long-time rotation system, using crops, such as alfalfa, not subject to injury by this nematode, is adequate to control the nematode. In the California area this method apparently has not been successful. It has been shown that the presence of various susceptible weeds served to prevent the nematode from being starved out. Improvement of the alfalfa stands by better methods of culture, by application of commercial fertilizer, primarily phosphate, where necessary, and by plowing up the alfalfa as soon as weediness begins to develop, has made nematode control by crop rotation successful in California.

The leaf-spot disease caused very great damage in 1930. In experiments in Colorado, where the disease was at its worst, the leaf spot was controlled by dusting the fields with a fungicidal dust, composed of 20 per cent copper sulphate (dehydrated) and 80 per cent lime (hydrated), applied four or five times at 10-day intervals, beginning about July 1. The total cost of the treatment, about $5 an acre, was greatly exceeded by the gains obtained through leaf-spot control. In many large-scale tests increases of 1½ to 2 tons per acre in yield and from 750 to 1,000 pounds of sugar (estimated, net) resulted from the dusting. Commercial use of the method on about 500 acres was similarly successful.

Disease-Resistant Strains

Leaf-spot-resistant and curly-top-resistant strains of sugar beets have now been produced as a result of years of intensive pathological and breeding work by the Department of Agriculture. By selecting individuals that were outstanding under conditions of severe disease outbreak, and by repeated elimination tests, strains of beets that are highly resistant, of high quality, and of high yielding capacity have now been obtained. In the 1930 tests the leaf-spot-resistant selections produced approximately 2 tons more beets per acre, containing 1½ to 2 per cent more sugar, than the commercial checks. The curly-top-resistant strains under moderately severe curly-top conditions outyielded the commercial checks 3 to 1, and except for the most severe

curly-top conditions apparently give satisfactory yields. Breeding work to improve these resistant strains further is being continued, and as rapid an increase of the present seed stocks as practicable is being made to permit introduction of these improved strains into commercial use.

Disease-resistant strains represent the ultimate solution of the serious disease problems in sugar-beet growing. Since all the sugar-beet seed used is under the direct control of the contracting companies, the resistant strains, as soon as they become available in adequate quantity, can readily be substituted for the nonresistant strains. Such a control measure, which entails little if any extra cost, will largely free the farmer from the disease hazard which now is so serious in many areas, and will also bring about the return of sugar-beet production in many areas where beet culture has been abandoned because of diseases.

Sugar-beet growing can be said to be entering a new era in which safe and effective methods for increased crop production and for the prevention of disease losses will be employed to a far greater extent than has been done previously. The sugar beet responds readily to proper cultural practices, and the improved methods of crop handling will bring about efficiency and economy in production. In addition, specific control measures, such as seed treatment, dusting to prevent leaf diseases, the scientific use of rotation as a sanitation measure, and other methods which are under development, will greatly reduce the present crop losses. In this phase the disease-resistant strains are especially important. The finding that strains of sugar beets which are resistant to disease can be developed by methods of selection and breeding is significant not alone because of the relationship to the particular diseases that have been under study but because of the wide adaptability of the finding to other and similar sugar-beet problems.

G. H. Coons, *Bureau of Plant Industry.*

SWINE Take Lungworms into Their Bodies by Consuming Earthworms

Lungworms, of which three different kinds are known to occur in swine, are among the most injurious parasites which infest these animals. The young forms of various other parasites of swine remain in the lungs for varying periods and then pass out of these organs, but lungworms localize in the lungs and remain there throughout their life. The degree of injury inflicted by lungworms depends to a large extent upon the number of worms which lodge in the lungs as well as upon the degree of resistance the animals offer to the invasion of the parasites. Young pigs have comparatively little resistance to parasites in general, and a heavy lungworm invasion of such vital organs as the lungs is likely to produce serious consequences.

The most outstanding symptom of lungworm infestation is a husky cough, a condition which weakens an animal, particularly a young animal, and lowers its vitality. Though lungworms occur in the windpipe and in its two main branches, the bronchi, they usually accumulate in the finer branches of the bronchi, known as the bronchioles. They are commonly present in sufficient numbers to plug completely the finer bronchioles in which they lodge, thereby interfering with normal breathing. The accumulation of the worms in these locations is commonly accompanied by more or less localized pneumonia.

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A Knowledge of Life History Important

In order to combat a parasite it is important to know the essential facts of its life history, particularly the way in which it gains entrance to its host. Without this knowledge comparatively little can be accomplished in the way of rational control and prevention. Until very recently nothing was known regarding the manner in which lungworms entered the bodies of swine and of their subsequent development in the hosts. In view of this no recommendations of control and preventive measures could be made with any assurance of success.

Investigations carried out in the Zoological Division of the Bureau of Animal Industry a number of years ago demonstrated conclusively that the larvæ of swine lungworms, which hatch from eggs that are discharged by these parasites, are not capable of infecting swine. The results of these investigations pointed to the likelihood of an intermediate host in which the parasites would have to undergo part of their development before being capable of establishing themselves in swine. However, the kind of intermediate host involved in the life history of swine lungworms was not determined in the course of these investigations.

Earthworms Found to Transmit Lungworms

In 1929 two German scientists discovered that common earthworms, or angleworms, were the intermediate hosts of swine lungworms, and demonstrated that swine could be experimentally infected by feeding them infested earthworms. These investigations were promptly confirmed by the writer and J. E. Alicata, junior zoologist, of this bureau, who traced the complete life history of the parasites from the time they entered the bodies of earthworms until they attained their full development in swine. Briefly, the life history is as follows:

Swine infested with lungworms eliminate the eggs of these parasites with the manure. Earthworms which are present in hog lots and pastures take the manure into their bodies and with it the larval lungworms which hatch from the eggs. Once inside the body of earthworms, the lungworm larvæ enter the wall of the esophagus, and in this and other locations to which they wander the larvæ grow and develop to a stage which is infective to swine. In warm weather the period required for the development of lungworm larvæ in earthworms is about 10 days but in cooler weather this period is prolonged considerably. It has been determined that lungworm larvæ may remain alive in earthworms for several months. If infested earthworms are eaten by pigs, the lungworm larvæ are set free in the intestine as a result of digestion. The larvæ then penetrate the wall of the pig's intestine and on reaching the lymph spaces they are carried along with the lymph stream and thus get into the blood. They finally localize in the lungs and attain fertile maturity in about four weeks.

Earthworms Abundant in Old Hog Lots and Permanent Pastures

Investigations carried out on farms in Maryland, North Carolina, and Georgia have shown that earthworms are particularly abundant in

old hog lots and on permanent pastures. The accumulation of manure and litter in permanent hog lots is especially favorable to the perpetuation of earthworms which thrive and multiply in such places, presumably because of the abundant food supply which they obtain from the manure. Well-drained, cultivated fields, on the other hand, have been found to contain relatively few earthworms. In some fields which had been cultivated seasonally, very few earthworms were found after a rather prolonged search.

In the light of these findings, it is evident that lungworm infestation in swine is likely to be present and troublesome when these animals are raised in hog lots and on permanent pastures. This was actually found to be the case in investigations conducted in the States mentioned. A large percentage of earthworms, obtained from old hog lots and from permanent pastures on which hogs had been raised year in and year out, were found to be infested with lungworm larvæ. In some cases 1,000 or more larvæ were found in a single earthworm.

In view of the rooting habits of swine, it is easy to see how they would become heavily infested with lungworms should they happen to swallow, as they are likely to do, only two or three heavily infested earthworms. As already stated, earthworms were obtained in only very small numbers from hog lots and pastures which had been cultivated seasonally, and in these cases the degree of infestation of the earthworms with lungworm larvæ was usually slight, or infestation was altogether absent. Low areas outside the fences of these cultivated fields usually harbored a fair supply of earthworms more or less heavily infested.

Keep Pigs Confined in Clean Fields

It is evident from these findings that control of lungworm infestation in pigs necessitates raising the animals on new pastures or cultivated fields, and preferably on fields which are well drained. In this connection it is important to have good fences in order to keep the animals from getting outside the fields. Pigs should not be raised on old hog lots and permanent pastures, as these places harbor not only earthworms, the source of lungworm infestation, but also eggs and larvæ of various other swine parasites and the germs of infectious diseases.

Benjamin Schwartz, *Bureau of Animal Industry.*

TENDERNESS Tester for Canned Goods Aids in Food Law Enforcement

The McNary-Mapes amendment to the food and drugs act, signed July 8, 1930, charges the Department of Agriculture with the responsibility for fixing standards of quality and condition for certain canned foods. The amendment requires a special form of low-quality branding on all products falling below the announced standards. Faced with the necessity of measuring the various quality factors in some accurate and objective manner, the department's scientists were forced to invent an apparatus for measuring tenderness, a major factor in the quality of many canned foods.

After exhaustive experiments, a device [3] was perfected that is sufficiently versatile to measure with precision the tenderness of such

[3] This apparatus is described and illustrated in Department Circular No. 164, An Apparatus for Determining the Tenderness in Certain Canned Fruits and Vegetables.

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widely different canned foods as peas, peaches, apricots, and pears. In every case, department findings have tallied with the consensus of expert graders as to the point at which lack of tenderness becomes definitely objectionable.

The advantages of an impersonal method of tenderness measurement, independent of personal judgment, capable of and giving accurate results in the hands of any intelligent operator, are obvious. The canner can assure himself, by his own tests, that his product conforms to the tenderness requirement. On standardized products, like peas for example, where tenderness is a paramount quality factor, the consumer is warned against hard and tough canned food by the low-quality legend required by law. Last, and most important of all, the farmer now seems to have some hope of getting, in the future, a satisfactory reward for producing fruits and vegetables of the proper stage of maturity for canning. There seems to be no reason why the apparatus should not prove equally satisfactory for measuring the tenderness of many raw food products of various sorts, and of other canned foods not yet under standardization. The device is illustrated in Figure 138.

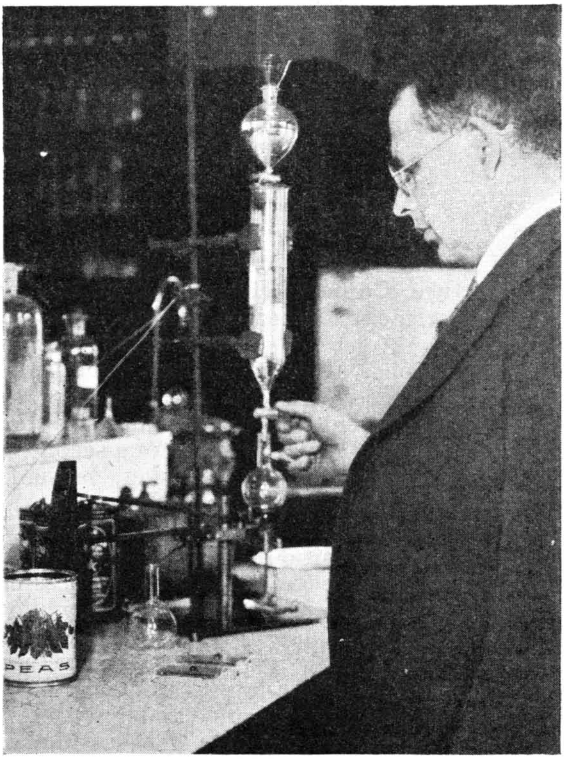

FIGURE 138.—V. B. Bonney using apparatus designed by him and other chemists to test the tenderness of canned peas

As used on fruits, the device is very simple, consisting essentially of a vertical metal plunger sliding freely in a close-fitting sleeve. On its lower end is a cylindrical rod of specified diameter, which is made to penetrate the fruit by means of a load of mercury applied at the upper end of the plunger. Penetration is abrupt and complete, and the weight of plunger, flask, and mercury at the moment of penetration constitutes a precise measure of the tenderness of the fruit under test.

Resistance to Crushing Measured

With a canned food, such as peas, the device becomes more complicated. Crushing is a better measure of tenderness here than penetration, and the rod is accordingly replaced by a horizontal metal disk.

The end-point is not definite as in the penetration test for fruits, and thus it is necessary to crush the pea to some predetermined fraction of its original thickness. This necessitates a micrometric method of measuring the diameter. This is effectively accomplished by a long lever so pivoted as greatly to magnify the measurements, which are then read off on a graduated scale. Scale and lever are so insulated that a buzzer will sound when the disk is depressed to any predetermined distance from the "zero point," which is, of course, the point where the disk is in contact with the surface which supports the material under test. The adjustment is such that, in this position, the lever reads zero on a graduated scale. If, now, a pea is found to measure 28 on the arbitrary scale, one can set the lever at 7 and be assured that the buzzer will sound when the pea has been crushed to exactly one-fourth its original diameter by the load of mercury. Mercury, flask, and plunger are then weighed as in testing fruit.

W. B. WHITE, *Food and Drug Administration.*

TIME-LAPSE Motion-Picture Camera Helps Department's Research[4] For several years the Department of Agriculture has possessed a so-called time-lapse motion-picture camera, designed for making accelerated-action cinematographs. This equipment, consisting of an ordinary motion-picture camera, with clock movement, motor, and associated automatic switches, enables the cinematographer to make exposures at intervals ranging from a fraction of a second to one hour, thus making film that, with normal projection, presents action accelerated in proportion to the length of time between exposures.[5]

Time-lapse shots have been made with this device from time to time for use in departmental motion pictures, but it was not until 1928 that the experimenters began to realize the possibilities of time-lapse cinematography in research. At that time, while they were running time-lapse shots of germination tests for the seed-testing laboratory of the Bureau of Plant Industry, something developed that gave them a new conception of the time-lapse camera as an instrument for research.

The work had been planned to show the progress of a germination test as a minor feature of a general film on seed testing, but the behavior of certain seedlings, that germinated but failed to grow, proved so unexpected and interesting that an entirely new set of tests was started solely for the purpose of observing the peculiarities of these abnormal seedlings. The time-lapse camera was run for many weeks on these tests and the result was so enlightening to those who conducted the experiment that they took the film to Rome on the occasion of the fifth congress of the International Seed Testing Association and showed it before that body. Edgar Brown, in charge of the seed-testing laboratory, relates that it was necessary to run the film many times in succession in order that the audience might have an opportunity to observe carefully the action of the abnormal seedlings in question.

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[4] This article summarizes the material presented in an article by the same writer in the Journal of the Society of Motion Picture Engineers, Vol. XVI, No. 5.

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Used in Studying Bacteria

During the winter of 1929–30 the research laboratories of the Bureau of Dairy Industry used the time-lapse camera in studying the growth of bacterial cultures. For this purpose a Pyrex glass tube 7 millimeters in diameter and 30 meters long, coiled in a flat spiral and filled with an infusion broth, was used as a track along which the progression of the bacterial growth was to be photographed. The culture was started at the center of the coil, and as it worked outward through the coil its progress was marked by a decided change in color of the liquid in the tube. The coil was so mounted as to fill the field of the camera. The room in which the work was done was held at an even temperature by automatic controls and exposures were made at 5-minute intervals. A watch, placed in one corner of the field, provided a check on the timing mechanism of the camera. About eight days were required for the culture to traverse the 30-meter length of the coil, and during that time about 140 feet of film was exposed.

This film was then projected with a film-strip projector to the full size of the coil itself, and working on this projected picture, one frame at a time, a series of measurements was made and tabulated. These measurements, disclosing the progress of the culture in millimeters per hour, were plotted against the total hours of growth, and the resultant grapn indicated beyond question the fact that the growth of the bacteria was intermittent and that the recurring periods of growth and rest were fairly rhythmical. These facts were of profound interest to the investigators who conducted the experiment. The paper on the subject, by L. A. Rogers and G. R. Greenbank, published in the Journal of Bacteriology, aroused keen interest among bacteriologists in general, since the time-lapse cinematographs in question served to establish facts that had been suggested by the growth of cultures on agar plates, but which could not positively be proved by that method. As to the ultimate scientific significance of this fact, one can only conjecture; it may or may not have a bearing on intermittent fevers. In any event it provides further evidence of the value of time-lapse cinematography in research.

Not Used as a Motion Picture

It should be noted that neither in the case of the germination test, nor in that of the culture test was the resultant film used as a motion picture in the sense in which we are accustomed to think of motion pictures. In the first instance the film was projected over and over, to enable the observers to make careful note of minute movements of the roots and stems of the seedlings; in the second instance the film was not used on a motion picture projector at all but on a slide projector.

In this connection, then, the time-lapse camera should be considered as an instrument in the same category as the microscope; it makes visible to the eye action that is normally invisible, as the microscope makes visible to the eye objects that are normally invisible. The microscope exaggerates space; the time-lapse camera epitomizes time with reference to movement, and shows motions and rhythms which are hidden by the normal lapse of the hours.

RAYMOND EVANS, *Extension Service.*

TOBACCO Culture Needs Improvement in Methods of Growing and Curing A number of distinctive types of tobacco are produced, each of which is grown in certain areas possessing the proper conditions of climate and soil. Generally speaking, it is a waste of time and money to try to change the type produced in a given locality. It is useless, for example, to attempt to grow cigarette tobacco in cigar-filler tobacco territory, or to grow bright flue-cured leaf in regions adapted to the production of dark, heavy air-cured or fire-cured tobaccos. As a rule only local varieties of seed should be used. Moreover, far too many local varieties and strains are in use. Promising results have been obtained in developing standard local strains possessing ample yielding capacity and desirable habits of growth, including necessary resistance to diseases, and at the same time capable of producing a quality of product generally acceptable to the manufacturer. General use of standard strains would go far toward insuring for each distinctive type a product of greater uniformity and higher quality.

Soil Management and the Cropping System

To obtain high-quality tobacco of a given type it is not only necessary to choose the right type of soil but it is also important to maintain the right conditions in the soil. Recent investigation has emphasized the special need of giving close attention to two of these conditions, namely, soil reaction and soil aeration. In general the tobacco plant grows best in a moderately acid soil, one having a pH value ranging from about 5 to 6. If the soil is too acid, among other things manganese or other heavy metals are likely to become sufficiently soluble to produce toxic effects on the plant. In a neutral or alkaline soil there is danger of serious damage from the black root rot disease. On some of the light sandy and sandy loam soils tobacco has been grown continuously for more than a half century without decline in yield or quality. Suitable systems of crop rotation may be needed to maintain other soil types in proper condition. However, on some soils tobacco is very sensitive to the effects of preceding crops in the rotation. On such soils tobacco may be a failure when grown after a timothy sod or after such crops as clover or corn. In this case continuous tobacco culture may give best results. The wild vegetation resulting from allowing the land to remain idle for two or three years often greatly improves the yield and especially the quality of the tobacco crop. It has been found that the tobacco plant also is very sensitive to inadequate aeration of the soil. In this connection thorough and frequent stirring of the soil is helpful, and oftentimes moderately high ridging of the rows, particularly in the later stages of cultivation, gives excellent results.

Fertilizer Usage

An abundance of plant food with a high proportion of nitrogen in the ration is needed for best results with cigar tobaccos. Cigarette tobaccos, especially the flue-cured type, should be grown with a comparatively low supply of nitrogen. For the cigar types grown without manure the proportions of nitrogen and potash should be about the same and equal to or somewhat greater than the proportion of phosphoric acid. When manure is used larger proportions of phosphoric acid and

potash are desirable. For cigarette types the nitrogen supply usually should be not more than one-half that of the phosphoric acid, while the potash supply should equal or exceed that of phosphoric acid. For the cigarette types, therefore, larger quantities of potash than have been formerly used are indicated. It appears that somewhat larger proportions of inorganic or organic water-soluble forms of nitrogen than have been supposed to be safe can advantageously be used in place of cottonseed meal and other similar organics in the case of cigarette tobaccos, where the fertilizer is applied in the row. Present indications are that these increases in water-soluble materials in the fertilizer, together with a tendency toward heavier rates of fertilizing, will make it necessary to resort to fractional or split applications on light soils. This problem is now under study.

Control of Diseases

In most instances prevention rather than cure is the key to effective control of diseases. Some of the most important diseases usually originate in the seed bed, and production of disease-free seedlings should be one of the principal aims of the grower. Effective seed-bed sanitation should include use of disease-free seed; employment of soil, frame, and covers for the seed bed known to be free from contamination or made so by steaming or other satisfactory method of sterilizing; application of all necessary measures to prevent infectious tobacco material from reaching the beds; avoiding careless use of tobacco in smoking or chewing when working about the beds. These precautionary measures apply particularly to wild fire and similar leaf-spot diseases and to mosaic. For black root rot and black shank the use of highly resistant varieties offers the best method of control. For root knot and Granville wilt, crop rotation is the only method of control now available. Rotation also is an important step in preventing the development of mosaic in the field.

Curing

Air curing, pure and simple, gives satisfactory results only when the weather conditions are reasonably favorable. In periods of excessively wet weather, losses from pole sweat or house burn are to be expected unless some form of artificial heat is used to reduce the humidity. There is great need of a cheap, effective method of introducing into the barn, air that has been previously conditioned. In the meantime more general use should be made of charcoal fires on the floor of the barn as a means of preventing pole sweat. In flue curing an important forward step has been made in the introduction of fireproof barns constructed of clay or concrete tile. The dwindling supply of wood for fuel is creating a need for more economical methods of obtaining the necessary heat for flue curing. Similarly, for fire curing it is becoming increasingly difficult to obtain an adequate supply of suitable hardwoods for fuel, and research is needed in the use of wood distillates or other substitutes for imparting the necessary flavor in the smoke curing. Scarcity of fuel often leads to insufficient firing or smoking during the curing.

W. W. Garner, *Bureau of Plant Industry.*

TOBACCO Grading and Market News Promote Fairer Auction System

The auction system of marketing tobacco through which approximately 82 per cent of American tobacco is sold is the only large-scale system of marketing through which lots of identical quality sell at widely different prices, on the same market, on the same day, under the same conditions, and to the same set of buyers. A lot of tobacco may be auctioned at a certain price and almost immediately thereafter be resold for double or half the amount first offered. The wide spread in prices paid for lots of the same grade of tobacco on auction floors is due to several factors. One of the principal factors is the system of buying on the basis of average prices for private grades. Each buyer will purchase tobacco according to several private grades. The buyer is not concerned with the price of individual lots but buys to make any grade average a certain price for the day's purchase. If a buyer has an average of $20 per 100 pounds on a particular grade and secures certain lots of that quality at $10, he can buy in other lots of the same quality at $30 and keep his average within stipulated limits. This undesirable feature of the auction system makes it impossible for farmers to determine the market value of any tobacco they may have for sale. In addition, each buyer indicates the quality of his purchases by private grade marks and this further confuses farmers since they are unable to interpret correctly the grade symbols of all buyers.

It is evident, therefore, that farmers require information on two separate, but closely related, phases of tobacco marketing. They should know the grade of each lot and the average market price being paid for each grade. The first has been provided by the United States standard grades for tobacco and their application through the Federal-State tobacco-grading service. The second can be supplied only by furnishing farmers prices at which standard grades are actually sold. This is done through the market-news service on tobacco.

Three distinct classes of tobacco are marketed by the auction system. These are known as flue cured, fire cured, and air cured, and in appearance and use are as distinct as three kinds of fruits or vegetables. These classes are subdivided into types. Each tobacco market is usually organized for the sale of a particular type, and for this reason, market-news information from markets of one type is of no great value to farmers who produce tobacco of another type.

Necessary Bases of the Service

Market-news service on tobacco, to be of benefit to farmers and the trade in general, must be based upon sales of individual types of tobacco and average prices for the grades of a particular type must be determined by actually grading a large volume and calculating the average price for each grade. The tobacco market-news service of the department is based upon all information that can be obtained and compiled for a type area. Only one tobacco market-news office is established for a type, since the variation in price per grade on any market is almost as great as that between markets and also because the expense of operating a tobacco market-news service would be needlessly increased by reporting each market separately. In some cases it has been possible to secure sufficient price information from one important market of the type, whereas for other types it has been practicable to

secure information from several markets and correlate it at one news office that issues reports for the type.

Three kinds of reports are issued: Press reports, daily mimeographed reports, and weekly mimeographed reports. Press reports are released by telegraph to the press on the afternoon of each marketing day. These reports give average prices paid, on the day of dispatch, for certain "key" grades; information as to the volume of sales for the market, or markets; and range in quality of the tobacco offered for sale. Daily tobacco market-news reports are mimeographed, at the local market-news office, on each marketing day. These are distributed to farmers on auction floors and by mail. They are also sent to the agricultural press, agricultural teachers, county agents, warehousemen, tobacco companies, and other persons interested in the tobacco industry, who request that their names be placed on the mailing list. In daily reports, average prices, by grades, are given for the day as compared with averages for the previous day, for the previous week, and for the season to the end of the previous week. Information relating to individual markets and general price comments are also included in daily reports. State officials have cooperated by broadcasting over the radio information contained in either daily or press reports. Weekly reports are issued on Saturday from tobacco market-news offices for each type. The weekly reports give average prices per grade for the week, for the season to date and for the previous season. These reports also review the market conditions for the week and give information on crop conditions, on stocks on hand by types, and on domestic and foreign conditions affecting the tobacco industry.

Farmers can, by consulting the reports of the tobacco market-news service, keep thoroughly posted on current tobacco prices, by grades. Immediately following an auction sale, farmers have the privilege of rejecting the prices offered for any lots of tobacco, but heretofore they have had no definite information which could be used as a guide in accepting or rejecting bids offered. The application of standard grades and the market-news service on tobacco provide the means for a more uniform and equitable system for marketing tobacco on auction floors.

FRANK B. WILKINSON, *Bureau of Agricultural Economics.*

TOMATO Variety Called Break o' Day Succeeds in Far Scattered Tests

A new variety of early tomato called Break o' Day is the outstanding result of a cross of Marglobe on Marvana made in the greenhouses of the United States Department of Agriculture at Washington, D. C., in 1923 by the late Fred J. Pritchard, formerly senior physiologist in the Division of Horticultural Crops and Diseases of the Bureau of Plant Industry. The new tomato is rapidly gaining favor as a marketing and shipping variety because of its earliness and the large proportion of fancy fruits that it produces over a relatively long bearing season. It has been tested in commercial plantings in practically all of the tomato-growing areas east of the Mississippi River from Maine to Florida, with a few scattered plantings reported westward to the Pacific coast. Although the results reported from these widely scattered tests have in most instances been remarkably successful, there

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have been a few unfavorable reports, which are not surprising when any variety is tested over such a wide range of climatic, soil, and cultural conditions. The distinctive characters that would give the variety outstanding merit in one environment might cause it to be considered inferior under another set of conditions. The Break o' Day has already been enthusiastically received in a large number of tomato-growing centers in which it has demonstrated its superior worth.

Produces Good Quality Fruit Early

The Break o' Day combines the earliness of the Marvana parent with the approximate fruit size, shape, and quality of the Marglobe

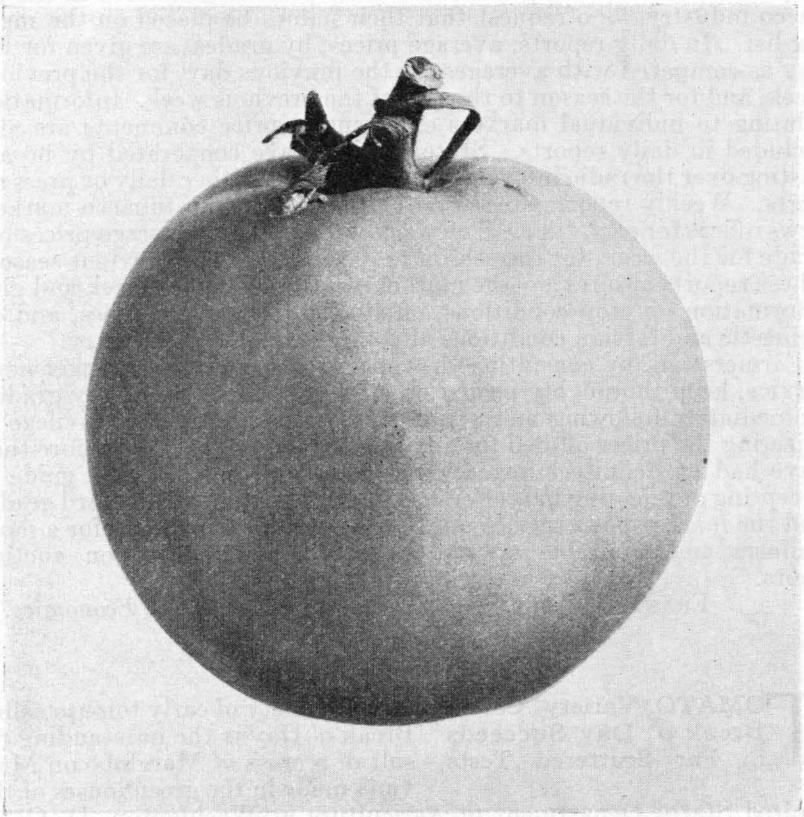

FIGURE 139.—Fruit of Break o' Day tomato

parent. It is at least 10 days earlier on the average than Marglobe, and although it produces fewer early fruits than either Marvana or Earliana, it produces nearly as much early fruit by weight, and the fruit is superior to that of the other early varieties in size, solidity, color, and flavor. (Fig. 139.) The vines of the Break o' Day are small leaved and of an open, sprawling type which makes practically all the fruits visible to the picker without moving the foliage of the plant aside. In this respect Break o' Day is very similar to the Marvana parent, which has the Earliana vine type, although the Break o' Day vines are larger.

Heavier foliage would no doubt give more protection to the fruit during very hot weather. However, sparse small-leaved foliage seems to be associated with early flowering and early setting of fruit, and since an early set of fruit is such an important factor in an early variety, the shortcomings of the scanty foliage are probably outweighed by its advantages.

Resists Diseases and has Long Bearing Season

Break o' Day is resistant to Fusarium wilt of vines and to nailhead rust of fruits. It is also slightly resistant to blights, especially Septoria leaf spot and early blight. In many field tests the Break o' Day and Marglobe were practically free from blossom-end rot when other varieties growing beside them were badly affected by it, and the fruits were not so susceptible to cracking as were those of most of the other varieties. It also withstood the prolonged hot dry weather of 1930 better than other varieties.

In yield, Break o' Day is superior to Earliana, for it not only produces approximately as much early fruit but on fertile soils usually continues to bear until killed by frost. Yields of 15 tons per acre were reported by several growers in the dry year 1930. Furthermore, the vines, which are well supported by an extensive root system, produce a large proportion of fruit of fancy sizes throughout the picking season, because of the habit of setting a uniform succession of fruits.

Well-Ripened Fruits are Bright Scarlet

On the department's test plots where the Break o' Day lines were grown while the variety was being developed, the fruits ripened very evenly, passing successively during the ripening process from a yellow green to yellow red, finally becoming bright scarlet on the outside, with scarlet red internal color. However, during the intense drought and heat of 1930, and the heat of 1931, some of the fruits failed to develop a good color, especially at the stem end, and some scalded. This difficulty, however, was no more serious in Break o' Day than in other early varieties. The failure to develop a satisfactory color in the cases cited was probably due to the high temperatures, ranging from 90° to 108° F., which prevailed during the ripening period. The development of the red pigment of the tomato fruit is inhibited at temperatures above 86°.

The immature fruits are a light shade of green throughout their development until they enter the ripening stages. In tomato-growing areas where the tomatoes are picked and packed in the mature-green stage, this may sometimes cause premature picking, as the fruits of most varieties pass from a darker to a lighter green shade as they approach maturity, and this change of color is used as a picking indicator. The mature-green stage of any tomato variety can readily be determined, however, by cutting the fruit transversely with a sharp knife. When the seeds are pushed aside without being cut, the fruits are mature green. The color changes in Break o' Day fruits should be checked with this test until the picker is able to detect maturity from outward appearances, because tomato fruits picked before they reach the mature-green stage do not ripen well and therefore are of very inferior quality and flavor.

Favorably Received by Growers and Shippers in Many States

Although the merits and limitations of a new variety can not be definitely determined until after it has been widely grown for a number of years, the results obtained thus far with Break o' Day indicate that it will occupy a position of considerable importance among early varieties of tomatoes.

The Department of Agriculture has placed Break o' Day seed with commercial seed growers to enable them to produce a seed crop for the seed trade. It has also placed seed samples with seedsmen for use in their trial grounds. Therefore an ample supply of seed should be available for the crop season of 1932.

WILLIAM S. PORTE, *Bureau of Plant Industry.*

TRAIL Builder Developed For Use in Constructing National Forest Roads

The largest single job confronting the Forest Service in the Northwest is protecting the national forests from fire. Successful suppression of fires requires getting men, equipment, and supplies to the fire in a short time. While some fires occur within striking distance of roads and trails, lightning, one of the worst foes of western woods, often starts fires in inaccessible places. To reach these fires before they spread is the problem. Every minute counts, and more roads and trails are a vital necessity.

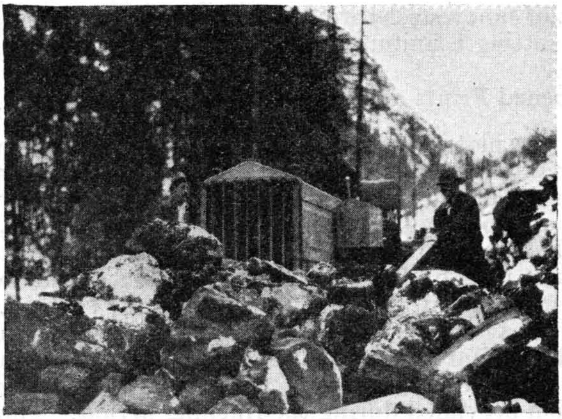

FIGURE 140.—The "trail builder" at work on the St. Joe River forest-road job, Idaho

To complete the protective and administrative road system within the national forests some 31,000 miles of road must be built or brought up to a higher standard. This involves the expenditure of some $60,000,000, and no small amount could be saved if machinery were devised to handle material at costs comparable to those for highway construction. (Fig. 140.)

Construction for public travel of low-standard pioneer roads with a width of from 10 to 12 feet is declining. Modern trucks and automobiles have supplanted old types of transportation. Present travel on highways demands a greater width than that of the pioneer road built to accommodate 2-way traffic.

Decline in low-standard roads has made manufacturers reluctant to invest funds in experimentation on machines for building them. Profits are much greater from producing machinery for handling the relatively large volume of material used in building the modern highway. Therefore, forest engineers had to undertake to solve their own problems.

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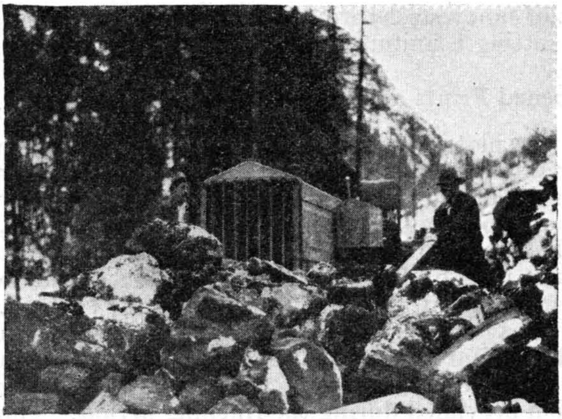

Figure 140.—The "trail builder" at work on the St. Joe River forest-road job, Idaho

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Necessity for Special Machinery

Use of ordinary highway-excavation machinery requires a roadbed much wider than the road necessary for forest use, and the cost of this wider roadbed, even when built with machinery, is more than the cost of a narrow road built largely by hand. This was the situation confronting Forest Service engineers when they sought machinery to build forest-development roads.

Formerly it was necessary to build by hand labor a trail not less that 6 feet wide to accommodate the small tractors and graders which built the balance of the road. This preliminary hand-built trail cost more than completing the road. Elimination of this handwork was a big part of the problem.

There was on the market a so-called "back filler," a large blade installed in front of a tractor and used for pushing dirt back into excavated trenches. With this machine as a base, experiments were carried on with various blades to determine which one would give the best cutting capacity, with a proper angle and a suitable lifting mechanism, the whole to be attached to a tractor of the proper size. (Fig. 141.)

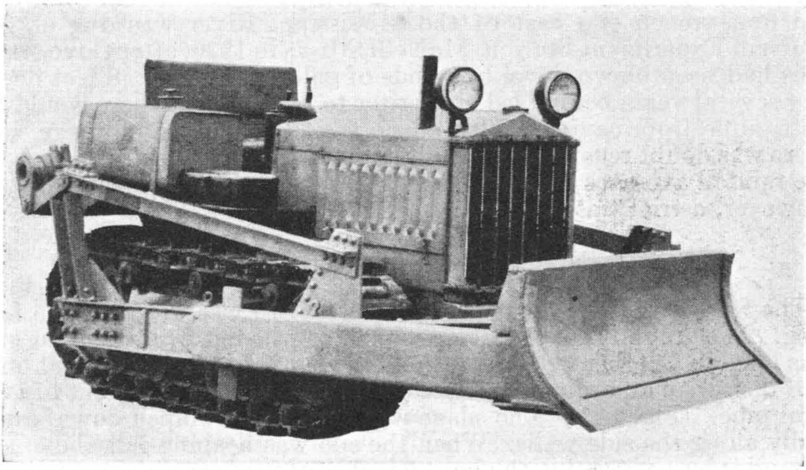

FIGURE 141.—The trail builder

Earlier experiments were made with small-sized tractors, but experience indicates that medium-sized tractors are best adapted for the work. The new machine is called a "trail builder," as it is used to build the original trail to a width of 8 or 9 feet, which is sufficient to accommodate tractors and graders which complete the road. The trail builder also grubs out small trees and brush. Its use has reduced the cost of forest-road construction almost 50 per cent.

The trail builder, as now developed for work in Montana and northern Idaho, was built by a Pacific-coast firm in conformity with plans and specifications submitted by the Forest Service, and is an attempt to correct weaknesses in previous models. Undoubtedly further progress will be made in perfecting the machine.

FRED E. THIEME, *Forest Service.*

TRENCH Silos, Provided With Drainage, Are a Success in Humid Areas A trench silo is merely a large trench dug in the ground with the ends on an incline so that a team or tractor can be driven through and practically all the work of construction done by power. The walls are finished smooth and nearly perpendicular with a spade. The width, length, and depth are varied according to the location or to the number of cattle to be fed. The idea of the trench silo is not new, since this type is merely a modified form of the pit silo. The construction of a trench silo, however, has the advantage of allowing all the excavating to be done without hoisting and does away with the necessity of materials for walls and of skilled labor for construction. These economies practically put a silo within the reach of any man who has time to dig one.

In parts of the West where there is little rainfall, trench silos have been used for a number of years, but they have found little favor in the East, where the winter rainfall is heavy. What is believed to be the first trench silo east of the Mississippi River was dug at the McNeill Experiment Station, McNeill, Miss., in 1926, after three stave silos had been blown down by winds of gale force. A pit 8 feet deep, dug several years before, led the writer to believe that there would be no trouble from caving walls and no serious danger of seepage, but there was doubt regarding the success of a trench silo in a region where the rainfall averages above 60 inches annually and is heavy in winter. However, a trial was considered worth while.

Need for Drainage Is Evident

The first trench silo dug was 10 feet deep, 10 feet wide, and 75 feet long. The ground in which it was dug was practically level. The silo was filled in October with sorghum silage cut to a length of about one-half inch with an ordinary blower cutter having only one joint of vertical pipe. (Fig. 142.) The silage was kept well tramped down, especially along the side walls. When the silo was heaping full above the ground it was covered with about 6 inches of pasture clippings to keep the dirt from sifting through on the silage, and a team and slip scraper were then used to add a layer of about 4 inches of dirt. The dirt was wet down to make it pack and a caterpillar tractor was run over it at intervals of several days. The dirt next to the side walls was kept tramped down to make it follow the silage as it settled.

This silo was opened for feeding the last of December. Feeding was started from one end and a narrow section of the silage was fed out from top to bottom, only enough being opened up at a time to last about two days. About 2 feet of water had accumulated in the bottom of the silo and this was pumped off. As water accumulated from rainfall during the winter it was pumped off or dipped out. Practically no silage was lost from spoilage. It had a bright color and good aroma immediately underneath the dirt cover, even on the end slopes where the depth was less than 1 foot.

Another silo was dug in 1927 in a location where a strong seep developed. At the time this silo was opened there was about 5 feet of water in the bottom. This water had to be pumped out every other day in order to feed out to the bottom of the silo, an operation which proved to be expensive. One or two feet of the silage in the bottom became water-logged and rank-smelling, but when fed with cottonseed

meal it was not refused by cattle although the seepage of such large quantities of water through it had probably caused a considerable loss of nutrients. This silo was again used successfully in 1928 but with the same trouble from water.

Choice of Location Important

In 1929 a third silo was dug in what was considered an ideal location. The main part of the silo was in fairly level land but one end opened into a deep ravine. (Fig. 143.) Drainage was provided by gravity through a short ditch. This silo was dug with a tractor pulling three slip scrapers, and most of the earth was moved on the level or downhill into the ravine. Three men and the tractor dug this silo to a capacity of

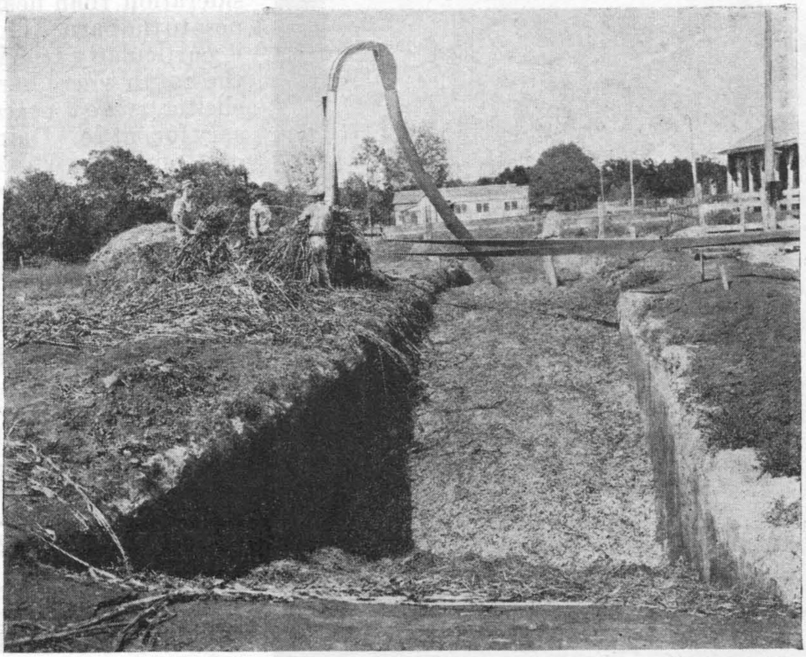

FIGURE 142.—Filling the original trench silo at the McNeill Experiment Station

130 tons in four days, with no expense of construction except for tractor and man labor. The water in the bottom of this silo has been drained as fast as it has accumulated, causing no trouble or expense whatever. The quality of the silage has been as good as any ever seen by the writer, the aroma being particularly mild. Cattle have eaten it greedily at all times without the addition of cottonseed meal.

As the location of the first two silos was such that they could not be drained by gravity, handling the water accumulating in them presented a problem until the very simple expedient of boring a hole in the bottom and letting the water drain off into the water table below was tried. An ordinary curb well auger was used to bore 23 feet to strike sand under the second trench silo, the drainage of which was particularly poor. The water was then turned into this well through a pipe with a strainer on the end. This took care of seepage water in

the silo where it had previously been necessary to pump every other day. When mud was allowed to wash into the well the drainage was stopped up but could be restored by jabbing with a pipe. The writer continued to use this silo but it was not so satisfactory as either of the other two.

As the original silo, in a level location, had some seepage in addition to the direct rainfall, a well was bored (fig. 144) in the bottom of it to a depth of 15 feet to strike sand. This well handled the water without further trouble. Such drainage will solve the water problem in locations where the water table does not rise above the bottom of the silo. The selection of a properly drained site near the fields where the silage is produced may be a more important consideration than nearness to the barn. This is particularly true in the South where barn shelter is not necessary for cattle. Dairy cattle may have their concentrated feed while being milked and then can be turned out to go to their roughage. This plan saves the labor of hauling the roughage to the barn.

FIGURE 143.—Trench silo of 130 tons capacity dug by three men with tractor in four days. Ditch for gravity drainage is in left foreground

Surface drainage is easily accomplished by ditches, and with bottom drainage provided for there appears to be no good reason for building a roof over the trench silo. This would be expensive and would be in the way of both filling and feeding. The direct rainfall seeping through the silage may cause a slight loss of nutrients but it will keep the silage moist and in good condition. Many above-ground silos are erected without roofs, the silage taking up all the direct rainfall.

Small Cost in Proportion to Capacity

The only serious objection commonly advanced against the trench silo is the accumulation of water, but this objection has now been overcome. There are many advantages, particularly the economy of construction. A trench silo may be dug at odd times. No materials need be purchased and no skilled labor is required for construction. The trench silos described were constructed at a cost of 58 cents per ton capacity, which was materially less than for other forms of silo con-

struction. With proper care in filling and tamping along the side walls, no appreciable spoilage occurs in the trench silo. Less expensive machinery is required for filling this type, as the cut silage does not have to be elevated by power but can drop into the silo by gravity. The silage is also easily removed; if desired, a carrier may be installed, as illustrated in Figure 144. The silo is storm-proof and can not rot down. In six years' use the only cost for maintenance has been to clean out the bottom before filling. No serious caving has occurred, and any slight caving is not a real depreciation since the silo is slightly larger after the fallen dirt has been cleaned out.

FIGURE 144.—Trench silo with well-boring outfit in foreground. Feed carrier and track are in background

If silage-cutting machinery is available at moderate cost in the neighborhood, trench silos can be dug and used successfully for herds as small as five or six cows and have been operated with success for one cow. The growing popularity of the trench silo has been almost spectacular. Several hundred trench silos have gone into use in Mississippi alone in the last three years and one county in Tennessee reports 50 dug in one year. No failures have been reported where proper drainage was provided.

S. W. GREENE, *Bureau of Animal Industry.*

TUBERCULOSIS Becomes a Serious Menace to the Poultry Industry Fowl or avian tuberculosis is becoming a serious menace to poultry raising, particularly in the Middle Western States. Surveys made in 1927 indicated that tuberculosis was present in poultry flocks in more than 500 counties in these States. The badly infected areas have now extended until they embrace at least 750 counties, causing an enormous

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loss of poultry, as well as of swine, which also are very susceptible to the fowl type of tuberculosis. Since disease in a flock increases the cost of production, sometimes to a point greater than the selling price of the product, it is imperative that all unnecessary losses be checked in order to save the industry from serious loss. As a means to this end Congress, in 1931, increased the tuberculosis-eradication fund so that more attention could be given to the eradication of fowl tuberculosis.

Plans for this effort were soon promulgated by representatives of the various poultry interests and by State and Federal livestock officials. These plans provide for cooperation between State and Federal livestock officials and all branches of the poultry industry. One phase of the plans provides that the work be conducted in restricted areas, where an employee of the State or Federal Department of Agriculture can visit each flock and demonstrate to the owner the presence or absence of tuberculosis by clinical inspection, tuberculin testing, or postmortem examination.

Disease Spreads in Various Ways

The disease is spread from flock to flock by the exchange of infected fowls which, however, may appear to be in perfect health. It may also be carried on shoes or grain sacks from infected pens. It does not appear that the disease is spread to any great extent by such birds as the English sparrow. The pigeon, however, is a carrier as it is susceptible to this type of infection. There seems to be but little danger of incubator chicks spreading infection, because infected eggs seldom hatch. When they do hatch, the chicks usually die within a few days. In view of these facts it is very important that breeding stock be purchased only from flocks known to be free from tuberculosis or that eggs be purchased and the stock raised under carefully guarded conditions.

New Ground Desirable for New Flocks

It is advisable to raise new flocks on clean grounds and to dispose of the entire flock at the end of the laying season or when the birds are about 18 months of age. Sanitation is important since the tubercle bacilli may live in protected places for a year or more. Disinfectants may be used to advantage on poultry houses and equipment, but it is not practicable to attempt to disinfect the ground over which the poultry range. Runs and pens should be plowed up and planted to some green crop whenever possible. An approved type of poultry house makes it easier to combat the disease. These recommendations, when followed, will greatly reduce and eventually eradicate tuberculosis and also many other diseases.

Symptoms of the Disease

Flock owners should acquaint themselves with the symptoms of this disease so that it may be detected before extensive infection in the flock has occurred. The most common symptoms of fowl tuberculosis are ravenous appetite, general emaciation, extreme weakness, swollen joints, and pale wattles and comb. A diagnosis may be made by applying the tuberculin test which, however, should be done by a competent veterinarian. The lesions commonly found are yellowish white nodules (tubercles) in the liver, spleen, and intestinal wall.

The size of the lesions ranges from that of a small grain of sand to that of a hazelnut.

During the last fiscal year, the veterinarians engaged in the eradication of bovine tuberculosis inspected, as an adjunct to that work, approximately 21,000,000 fowls and found approximately 9,000 flocks infected with tuberculosis. Whenever an infected flock is located by these field veterinarians the owner is informed of how to eradicate the disease. The percentage of infected swine has been very materially reduced in many sections, a result which indicates that the farmers are following these suggestions.

Information Methods Used

Information on fowl tuberculosis and its eradication is being disseminated through the press and local publications and by posters and exhibits. Figure 145 illustrates a part of an exhibit used in spreading

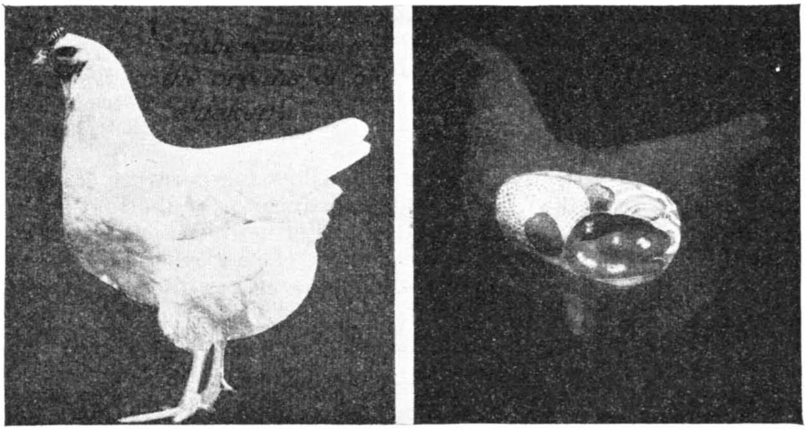

FIGURE 145.—Part of an exhibit, used to show the organs of a fowl that are most commonly affected with tuberculosis. An automatic lighting device first shows a seemingly normal hen, at left, and then, by internal illumination, the evidence of disease in the same fowl

information on fowl tuberculosis. The exhibit is electrically equipped so that it shows an apparently normal bird, and then, after a flash, the same bird with diseased organs clearly visible in their natural position.

The department also has a 2-reel motion picture entitled "TB or not TB," which deals with tuberculosis in poultry and swine. This picture is available for educational work and may be borrowed for such a purpose through the Office of Motion Pictures of the department.

ELMER LASH, *Bureau of Animal Industry.*

TURNIPS Converted Into Appetizing Sauerkraut in the Same Way as Cabbage Many new foods have been suggested for the American table, and now comes turnip sauerkraut to take its place on the menu. Turnips are converted into an appetizing dish by the same methods of fermentation that are used in making cabbage sauerkraut. The wide-

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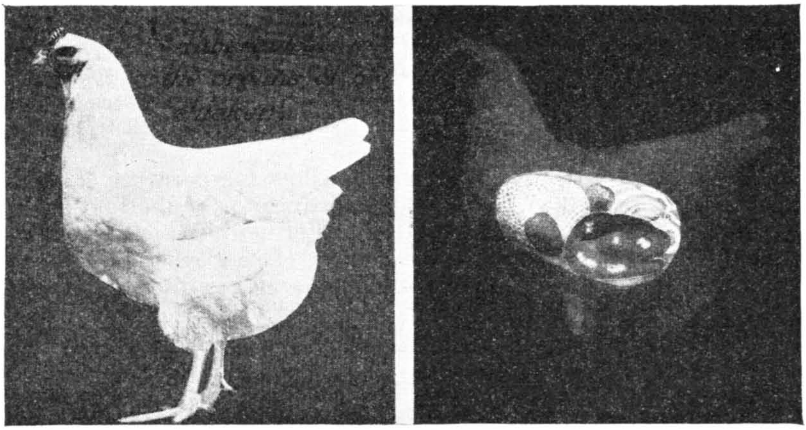

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spread use of turnips as a fall forage crop on the farm insures a constant source of supply without the extra labor of planting a special crop.

It has been found through experimentation that a very good sauerkraut can be made from medium-sized purple-top turnips. They should be firm, sweet, and juicy, because the proper fermentation and resultant flavor depend upon these factors. As turnips which have a woody or pithy flesh are low in sugar content, and possess a strong flavor or odor, they are not desirable for sauerkraut.

Method of Preparation

The tops and roots are removed, and the fleshy material is either shredded or ground in order that the juice may be extracted from the plant cells and the sugar subsequently converted into lactic acid. The shredded or ground material is mixed and salted at the rate of 4 ounces of salt to 10 pounds of turnips. The mixture is then packed in stone jars, weighted down, and allowed to ferment.

The sauerkraut may also be packed in glass fruit jars for fermentation, but the lids must remain loose for the first three or four days in order to allow the gas formed in the early part of the fermentation to escape. After the evolution of gas has ceased, the lids are tightened, and the fermentation is allowed to proceed to completion, which will require from three to four weeks.

Turnip sauerkraut may be stored at a low temperature for a considerable time, or it may be canned according to the method outlined in Farmers' Bulletin No. 1438, Making Fermented Pickles. Turnip sauerkraut possesses a sharp lactic flavor closely resembling that of good cabbage sauerkraut. Most of the characteristic turnip flavor is lost during the fermentation.

HARRY E. GORESLINE, *Bureau of Chemistry and Soils.*

TURPENTINE and Rosin Supply Essentials for Numerous Industries

Spirits of turpentine, oil of turpentine, or as more generally known, turpentine or simply "turps" is usually to be found in every country and town home. It is put to a hundred or more uses. Around the farm home it is ever ready, safe, and useful, either alone or mixed with other ingredients, as a liniment for people or domestic animals. Stokes' liniment (white liniment), for example, is an emulsion containing 40 per cent turpentine oil, 8 per cent acetic acid, 1.6 per cent lemon oil, and about 50 per cent water emulsified with the aid of eggs. Other liniments contain turpentine oil, ammonia, and camphor as the principal ingredients. In mixtures with mutton tallow or olive oil and gum camphor, turpentine finds a deservedly wide use as what the doctor calls a "rubefacient" to be rubbed on the chest and throat. It is a convenient article with which to remove greases and fresh paint from clothing. It is also used in wiping up and polishing floors, woodwork, and furniture, as a repellent for moths and vermin, and to clean porcelain ware and glass.

About 90 per cent of the turpentine produced in this country is used in paints and varnishes. The paint and varnish maker uses it for bringing his ready-to-use paints and varnishes to the right consistency and to hold in solution some of the ingredients. The master painter prefers it for mixing and thinning the paint which he puts on houses

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and other buildings. The furniture maker is also a large user of turpentine. The makers of wax polishes for shoes, floors, and furniture are the next largest users of turpentine. They use more than 500,000 gallons annually as it is a good solvent for the wax they use and it gives a smooth product which has the proper consistency, dries at the proper rate, and has a clean pleasant odor. Sealing waxes and plastics, chemicals and pharmaceutical preparations, oils and greases, and printing inks are other products in which thousands of gallons of turpentine are used, and minor uses consume a total of more than 60,000 gallons annually.

The individual's use of rosin is perhaps more indirect but none the less real. The paper maker uses nearly 400,000 barrels (500 pounds gross) of rosin annually in sizing papers of all kinds in order that the newspaper will not tear; that goods wrapped in paper may not be so easily spoiled by becoming wet; and that the ink may not spread over the writing paper. About 300,000 barrels of rosin are used each year in making varnish. Many high-priced varnishes contain a large percentage of rosin or rosin compounds. Because of the insufficient supply of fossil resins (nature's modified and durable rosins) varnishes would cost much more were it not for ample supplies of rosin. Rosin-tung oil or rosin-ester-tung oil varnishes are among those in greatest demand.

Soap makers use annually about 225,000 barrels of rosin, some of it in high-grade toilet soaps, to which it gives certain desirable characteristics. The fact that rosin makes a good laundry soap helps to keep the price of such soaps stable, when the cost of fats, oils, and greases would at times raise the price.

Paper making, varnish manufacture, and soap production, the three chief industries in which rosin is used, probably absorb about 90 per cent of the rosin made. There are, however, a number of other industries which consume many thousand barrels of this commodity. Linoleum making takes about 45,000 barrels; rosin oils and axle greases take 55,000 barrels; sealing waxes, pitches, and plastics need 40,000 barrels; foundries take 30,000 barrels in making cores and molds for castings of all kinds; printing inks take 15,000 barrels to give body to the inks; and 25,000 barrels or more are used for various minor purposes such as solder flux, battery seals, cable insulation, roofing, waterproofing compounds, asphalt emulsions, cellar cement, and paint driers. Rosin is also one of the ingredients of dehairing soaps used on the carcasses of hogs after the bulk of hair has been taken off, in order to take off the fine hair not removed in scalding.

Thus do turpentine and rosin, coproducts of the southern plantations and forests, supply essential raw materials for many important industries, and contribute to the individual well-being and comfort of citizens.

F. P. Veitch, *and* W. C. Smith,
Bureau of Chemistry and Soils.

TURPENTINE Operators to Have Benefit of Forestry Demonstration A new national forest in Florida, the Osceola, has recently been acquired by the United States primarily to demonstrate the correct handling of a comparatively large area of longleaf and slash pine land for the continuous production of turpentine, saw timber, and other

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forest products. This forest will eventually contain 145,000 acres of Government land. Its south boundary extends 15 miles along the main road between Lake City and Jacksonville; its north edge borders the Okeefonokee Swamp.

Slightly over two-thirds of the area consists of pine flatwoods from which the original stand of longleaf and slash pine has been cut. In general, there is good reproduction of both longleaf and slash pine, the latter predominating. On a large part of the area there are good stands of poles and older trees just approaching the size for turpentining. There are also decadent older trees which have been turpentined.

Numerous swamps are scattered throughout the pinelands, one large swamp covering about 10,000 acres. These contain a mixed stand of cypress and hardwoods, such as gum and bay. The best trees have been cut, but there remain some good stands of timber merchantable for ties and saw logs.

The unit was put under administration in December, 1929, after the Government had acquired 93,000 acres. Fortunately the area had been under cooperative fire protection with the State of Florida which had erected two towers and a telephone line upon it. These improvements were purchased from the State, and have been supplemented by fire lines and roads for fire-control purposes. During the fire season the forest is manned by the necessary lookouts and firemen, and in 1930 fire losses were held to 1.47 per cent of Government land burned over.

Inventory Made of Resources

An inventory of the resources of the Osceola National Forest has been made and a plan for management of the timber is nearing completion. The forest will be managed primarily for production of naval stores on a sustained-yield basis. Timber operations in the pine stands are now confined to completing the turpentining of older trees already cupped and the salvaging of worked-out timber. Cupping of round timber will begin within five years and as the growing stock is built up, the annual harvesting of naval stores will be increased until the forest comes into full production in the course of the next 10 or 15 years. In the meantime, the disposal of large overmature cypress for saw logs and some of the younger trees for railroad ties will yield a good revenue. Management of the swamps will insure such products in the future.

A record of costs has been kept to determine the financial success of this project. The capital investment when purchases and improvements have been completed will amount to about $850,000. The books show not only the investments, but the operating expenses, depreciation, and income. The forest will be developed according to sound forestry and business principles with the idea of showing not only how such an area can be brought into full production and kept there, but also whether it is profitable to do so.

Recently nearly 1,000 acres of round timber has been purchased on which the Forest Service will concentrate its major work in naval-stores research. Good practices developed here by laboratory methods and applied on the forest on a commercial scale will help to solve the problems of the naval-stores industry.

JOSEPH C. KIRCHER, *Forest Service.*

VEGETABLE Growing Finds Favorable Conditions in Some Great Plains Valleys In the western part of the central Great Plains area and in the intermountain valleys immediately to the westward are found numerous locations ranging in altitude from 4,000 to more than 10,000 feet where conditions are almost ideal for raising such vegetable crops as lettuce, cauliflower, peas, beans, and potatoes. To the northward, similar conditions are found at increasingly lower altitudes, where soil, water, and local climatic conditions are favorable. Such areas are usually protected mountain valleys, although often the mountainsides themselves provide suitable conditions.

Head Lettuce

The chief expansion in the culture of lettuce, cauliflower, and peas has taken place in Colorado, where a considerable industry has developed in the San Luis Valley, near Del Monte, near Avon, and in similar sections. The head-lettuce industry had its origin in 1918, when one farmer raised 10 acres of head lettuce as a crop following potatoes. From this small beginning the industry rapidly developed until in 1926 and 1927 over 13,000 acres of head lettuce was raised. It was during this period that the industry expanded into Wyoming, where a considerable head-lettuce industry sprang up near Laramie. Two years of partial crop failure and unfortunate marketing experiences were responsible for the decline of this particular venture.

The rise of the industry in Colorado is interesting in that it is typical of similar developments of the past in almost every branch of agriculture. Following the discovery that head lettuce could be so easily and profitably grown, many farmers undertook its culture. Most of them had never raised any crop other than potatoes and knew little or nothing of the cultural requirements of head lettuce, nor did they have the necessary equipment or marketing facilities. Under such conditions it was inevitable that many should fail in their earlier attempts. Overproduction of lettuce, inferior in quality, together with keen competition from California, Idaho, Washington, and other States that market their crop at the same time, all combined to eliminate the inexperienced growers and those who had taken up the enterprise as a speculation.

At the present time head lettuce and the other crops named are largely raised as a part of a general crop rotation. When new land is to be brought under cultivation it is first cleared of aspen or sagebrush, plowed, and a crop of potatoes raised the first year. These may be followed by head lettuce or by one of the other crops. The more progressive growers include alfalfa or sweetclover in the rotation. The former is generally preferred, since it furnishes feed for livestock and the later growth may be turned under as green manure.

Practically no commercial fertilizers except phosphorus carriers are used. It is sometimes applied to land showing a marked deficiency. When available, manure from a feed lot is the most commonly used fertilizer.

Soils selected for head lettuce are usually dark, rich, and loamy. They are most often found where aspen has been cleared. They contain considerable organic matter in the form of leaf mold, but this is rapidly exhausted under cultivation and must be replaced. Lighter types of

soil are sometimes found satisfactory but are generally considered the cause of tipburn. Where early fall freezes are likely to occur, land with a slight slope is preferred to the level land of the valley floor.

New York (also known as Wonderful, Los Angeles Market, Iceberg, etc.), is the most popular variety of lettuce grown. Iceberg is sometimes planted as a variety that is more likely to mature satisfactory heads during warm weather. The true Iceberg, however, is not as popular on the market as the New York type.

Practically all of the head lettuce is raised under irrigation. This may be of the surface, subsurface, or semisubirrigation type. Surface irrigation by means of furrows is by far the most satisfactory. In certain localities, as in the San Luis Valley, the water table is naturally high and subirrigation is practiced. This is accomplished by means of a large ditch surrounding or running through the field, raising the natural water table to within reach of the roots. In the semisubirrigation type the water table is raised as far as possible by means of subirrigation and the irrigation is completed by furrow surface watering.

Cauliflower

Cauliflower succeeds well at elevations of from 4,000 to 5,000 feet above sea level. At higher elevations the cold nights and often cool days retard its growth.

For its best development, cauliflower requires a somewhat heavier type of soil than lettuce. It also requires a high percentage of organic matter, and applications of 20 tons or more of manure per acre are common.

Most of the cauliflower grown is of the Snowball type. The Colorado Agricultural College in its trials conducted at Fort Collins found the Improved Self-Protecting Snowball to be a very satisfactory strain.

Cauliflower requires a great deal more water than lettuce; its culture, therefore, is limited to localities where water is plentiful at all times. Any shortage of water, especially while the plants are nearing maturity, is almost certain to result in a poor crop.

The exact extent of the cauliflower industry in this region is difficult to determine. Car-lot shipments from Colorado totaled 411 cars in 1927 and 843 cars in 1928.[6] Probably the more important shipping points have not greatly changed since 1925, when Denver, Mesita, Pueblo, and San Acacio were the four most important.

Peas

Peas are the last of this group of crops grown extensively in this section. Here the climatic, water, and soil conditions seem especially favorable. The quality of peas is excellent because of the relatively cool weather found at these altitudes, which retards the conversion of sugars to starches. Marketing is also made easier, in that the pods may be left longer on the vines without injury after they attain edible maturity.

Considerable interest has been manifested in the production of peas for canning. At the present time, however, the most popular variety grown is the Dwarf Telephone or similar types. As this variety has rather large peas, and the public has been educated to associate small-

[6] U. S. Department of Agriculture, Statistical Bulletin No. 30.

ness of size with high quality, the canners hesitate to try to overcome this long-established prejudice. Conditions are exceptionally favorable, however, for growing peas for seed for those growers who are willing to plant improved strains and to give adequate attention to roguing off-type vines.

In 1925 the car-lot shipments of green peas from Colorado totaled 35. In 1927 shipments had increased to 149 carloads, and 348 carloads were shipped in 1928. These increases indicate a rather rapid development of the industry.

Dry Beans, Potatoes, and Seed Peas

The development of the high-altitude vegetable-growing industry in Wyoming is somewhat typical of what has taken place in other States of the central Great Plains area and the Intermountain region. While a diversity of crops is produced in small quantities, the main development has been in the raising of dry beans, potatoes, and to a lesser extent seed peas.

The Pinto and Great Northern varieties of beans are raised under dry-land conditions on the Plains at altitudes around 6,000 feet. In the Big Horn Basin region considerable acreage is devoted to raising the Great Northern variety of bean under irrigation. Here, too, are raised some 10 varieties of peas and from 10 to 15 varieties of beans for seed. Some bean and pea seed is also raised in the Converse County area.

The bean industry has expanded from the production of 4,712 bushels in 1919 to a production of 726,000 bushels in 1930. Freedom of the crop from anthracnose has interested eastern seed companies in the possibility of securing their bean seed from this region.

The Bliss Triumph is the principal variety of potato grown in Wyoming, and probably accounts for 75 per cent of the total acreage, of which the remainder is mostly devoted to Irish Cobbler. Much of this acreage is used in raising certified seed, Laramie, Goshen, Platte, Niobrara, and Converse Counties leading in its production. In 1930 there were 2,306 carloads of potatoes shipped from Wyoming. It is estimated that of this number approximately 400 cars were shipped as certified stock. All potatoes raised for seed purposes are grown under dry-land conditions, while the commercial table stock is largely grown under irrigation. It seems likely that future expansion of the industry will be largely in the production of certified seed for the more southerly potato-producing areas.

M. F. Babb, *Bureau of Plant Industry.*

VEGETABLE Standardization and Variety Description Project is in Progress

For many years there has been great confusion about just what characteristics a certain variety of vegetable should possess. There has been no authentic standard which seedsmen could use as a guide in producing seed stocks and which a grower or dealer could use as a basis for his conception of a variety. Ample evidence of this lack of agreement and of the absence of such standards is the many differently appearing products that growers obtain, all under the same varietal name. Vegetable growers, canners, and seedsmen have long

ness of size with high quality, the canners hesitate to try to overcome this long-established prejudice. Conditions are exceptionally favorable, however, for growing peas for seed for those growers who are willing to plant improved strains and to give adequate attention to roguing off-type vines.

In 1925 the car-lot shipments of green peas from Colorado totaled 35. In 1927 shipments had increased to 149 carloads, and 348 carloads were shipped in 1928. These increases indicate a rather rapid development of the industry.

Dry Beans, Potatoes, and Seed Peas

The development of the high-altitude vegetable-growing industry in Wyoming is somewhat typical of what has taken place in other States of the central Great Plains area and the Intermountain region. While a diversity of crops is produced in small quantities, the main development has been in the raising of dry beans, potatoes, and to a lesser extent seed peas.

The Pinto and Great Northern varieties of beans are raised under dry-land conditions on the Plains at altitudes around 6,000 feet. In the Big Horn Basin region considerable acreage is devoted to raising the Great Northern variety of bean under irrigation. Here, too, are raised some 10 varieties of peas and from 10 to 15 varieties of beans for seed. Some bean and pea seed is also raised in the Converse County area.

The bean industry has expanded from the production of 4,712 bushels in 1919 to a production of 726,000 bushels in 1930. Freedom of the crop from anthracnose has interested eastern seed companies in the possibility of securing their bean seed from this region.

The Bliss Triumph is the principal variety of potato grown in Wyoming, and probably accounts for 75 per cent of the total acreage, of which the remainder is mostly devoted to Irish Cobbler. Much of this acreage is used in raising certified seed, Laramie, Goshen, Platte, Niobrara, and Converse Counties leading in its production. In 1930 there were 2,306 carloads of potatoes shipped from Wyoming. It is estimated that of this number approximately 400 cars were shipped as certified stock. All potatoes raised for seed purposes are grown under dry-land conditions, while the commercial table stock is largely grown under irrigation. It seems likely that future expansion of the industry will be largely in the production of certified seed for the more southerly potato-producing areas.

M. F. Babb, *Bureau of Plant Industry.*

VEGETABLE Standardization and Variety Description Project is in Progress

For many years there has been great confusion about just what characteristics a certain variety of vegetable should possess. There has been no authentic standard which seedsmen could use as a guide in producing seed stocks and which a grower or dealer could use as a basis for his conception of a variety. Ample evidence of this lack of agreement and of the absence of such standards is the many differently appearing products that growers obtain, all under the same varietal name. Vegetable growers, canners, and seedsmen have long

recognized the need of definite standards and adequate descriptions of the most important varieties; they have further recognized that only after such standards have been established can uniformity be expected in the offerings of seed in the trade.

Active work upon a standardization and varietal description project was begun in 1929 by the Division of Horticultural Crops and Diseases of the Bureau of Plant Industry.

In order to establish a standard that will be useful all over the country, it is necessary to work on a nation-wide scale in as many of the important vegetable-producing regions of the country as possible. The varieties for which standards are to be established are being grown over a wide range of conditions, so that their behavior and characteristics can be determined in different locations. Precautions have been taken to prevent local or provincial opinions taking the place of broad national viewpoints. From the first, all workers involved in this project have kept in contact with the industries they are trying to serve. The opinions of various qualified vegetable growers, canners, seedsmen, and experiment-station workers in many different parts of the country are being utilized, and the final results are intended to show as accurate a cross section of the country's opinion as it is possible to obtain.

Nineteen Experiment Stations Cooperating

The cooperation of 19 State experiment stations, scattered from Canada to the Gulf and from the Atlantic to the Pacific, has so far been enlisted in this project. The State workers have contributed greatly to the value of the results obtained, and the Department of Agriculture gladly acknowledges the splendid cooperation that has prevailed throughout this work. With the assistance of the vegetable-research committee of the American Seed Trade Association, a wide search has been made of American and European sources, and hundreds of stocks have been obtained from most of the actual producers of seeds of the crops under consideration.

The standard to be established for each variety is to be based upon and illustrated by material that is actually in existence, rather than upon an ideal specimen that would be so perfect as to be practically impossible of attainment. Ideal specimens and details of varietal characters are to be well illustrated, using natural colors when necessary.

Tentative descriptions and illustrations have been completed recently upon 18 of the most important market-garden and canning varieties of peas, namely: Alaska, Alderman, Daisy, Davis Perfection, Gem, Gradus, Hundredfold, Improved Advancer, Laxtonian, Laxton Progress, Little Marvel, Nott Excelsior, Surprise, Sutton Excelsior, Telephone, Thomas Laxton, World's Record, and Yellow Admiral. The pea-variety studies were carried on at Washington, D. C., and at Sturgeon Bay, Wis.

Three years' field work and the descriptions and illustrations upon cabbage have been completed. Studies were made at Washington, D. C.; Norfolk, Va.; Clemson College, S. C.; Winter Haven, Tex.; Davis, Calif.; Madison, Wis.; State College, Pa.; and Greeley, Colo. The varieties studied up to this time are Early Jersey Wakefield, Copenhagen Market, Early Winnigstadt, All Seasons, Late Flat Dutch, Glory of Enkhuizen, Danish Ballhead, and Wisconsin Hollander.

The tomato varieties under consideration are Earliana, Bonny Best, Globe, Marglobe, Early Detroit, Gulf State Market, Stone, Greater Baltimore, and Santa Clara. The tomato work was carried on by the various collaborators at Ithaca, N. Y.; East Lansing, Mich.; Lafayette, Ind.; Davis, Calif.; Weslaco, Winter Haven, Balmorhea, and Nacogdoches, Tex.; and at Washington, D. C.

In both the spring and fall of 1931 and the spring of 1932, stocks of beet, carrot, and spinach collected from numerous sources in this country and in Europe were studied. A total of about 60 strains of beets are being considered, including the following varieties: Extra Early Egyptian, Crosby Egyptian, Early Eclipse, Detroit Dark Red, Edmand Blood Turnip, Crimson Globe, Half Long Blood, and Long Smooth Blood. Work on beets is in progress at Washington, D. C., in California, Texas, and Virginia. Workers in these same regions and also in Minnesota are studying about 60 strains of the following varieties of carrots: French Forcing, Oxheart, Early Scarlet Horn, Chantenay, Nantes, Danvers Half Long, and Long Orange.

More than 60 strains of the following varieties of spinach are included in the program at present: Virginia Savoy, Bloomsdale Savoy, Long Standing Bloomsdale, Viroflay, Prickly or Winter, Gaudry, Victoria, Triumph, Princess Juliana, and King of Denmark. Spinach studies are conducted at Washington, D. C., and in Texas, California, and New York.

Plan of Collaboration

Each collaborator records certain data in detail, gives his personal impressions, and takes photographs of the material, all by a prearranged plan, so that the results of all workers are on such a basis that they can be accurately compared and studied. After the season's work, all collaborators gather and thoroughly discuss and criticize all results and opinions. Tentative standards and descriptions have been prepared for peas, cabbage, and tomatoes, and these have been further subjected to the criticisms of qualified growers, technical workers, and seedsmen so that the comments of these persons can be considered in the final preparation of the results. The tentative standards were before the collaborators during 1931, and each description was carefully checked with the behavior and appearance of each variety in the field to determine how usable and dependable the description is and to complete whatever details might have been lacking. Thus the plan provides for testing the results before they are released for publication. Publication of results upon cabbage, peas, and tomatoes is planned for 1932, but those on carrots, beets, and spinach must necessarily appear later.

As one crop or a group of varieties is completed, additional crops and varieties will be added to the project until all of the more important ones have been considered. By the time it has been possible to go the rounds once it may be necessary to revise and bring up to date standards for crops worked upon earlier; and there should also be an opportunity to add to the lists some of the less important varieties. It will also be necessary to add descriptions of important new varieties which certainly will appear on the market from time to time. It is obvious that the task is one that must continue indefinitely in order to meet the changing requirements of the industries interested in varieties of vegetables and to keep abreast of the times.

It is believed that the establishment of authentic standards which are adequately illustrated and described will encourage the production of stocks having higher degrees of excellence and will afford valuable guidance for persons interested in improving the nature of their stocks. There should also be a tendency for seed producers to concentrate upon varieties of importance, and there will be far less argument and confusion concerning what characteristics any important variety should show.

Victor R. Boswell, *Bureau of Plant Industry.*

WHEAT Bred to Resist Some Strains of Bunt May Succumb to Others

Marquis wheat has been grown for years in the spring-wheat region in general and has been considered rather resistant to stinking smut (bunt). During the last five or six years, however, it has suffered severe attacks. For several years little smut appeared in the Ridit and Albit varieties, bred in cooperative experiments at the Washington Agricultural Experiment Station particularly for bunt resistance, but more recently these varieties have sometimes been smutted. Cooperative studies at the Washington station show that these apparent changes in resistance are not due to deteriorations. When care is taken that they are exposed only to normal conditions in the regions where they are grown these varieties are as resistant as ever. The increase in the amount of infection is due to new strains of the bunt organisms that either have developed in the areas or have been brought in from elsewhere and are attacking the heretofore resistant varieties.

The plant breeder who is attempting to develop new wheat varieties resistant to bunt is vitally concerned with the number, distribution, and disease-producing ability, as well as the origin, of these different smut strains. If the different smut strains are fixed and do not change, the ones that do not occur in certain regions may be excluded, where practicable, by plant quarantines; and the plant breeder then would have to develop varieties resistant only to those strains present in his region. If the different new smut strains appear spontaneously or originate by hybridization, the problem is greatly complicated. It then becomes necessary to test new varieties for resistance to all the known strains of the disease, and the breeder's job is long and continuous.

Caused by Two Species of Fungi

Stinking smut or bunt of wheat is caused by two species of parasitic fungi known by their Latin names *Tilletia tritici* and *T. levis*. These two species resemble each other closely and can be distinguished only with the aid of a microscope. Under the microscope the surface walls of the spores of *T. tritici* appear rough or reticulated, while the surface walls of the spores of *T. levis* are smooth. The smutted kernel or bunt ball is a mass of several million of these spores, the reproducing bodies or "seeds" of these parasitic plants. The spore masses break up and the spores become attached to healthy wheat kernels during threshing and subsequent handling. When such smut-infested kernels are sown, the spores germinate with the seed. In germinating, each spore produces a short germ tube which bears at its tip 8 to 24 minute spores of another sort called sporidia. Recent cooperative studies at the

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Washington Agricultural Experiment Station have shown that a culture from a single sporidium can not infect wheat plants, but that cultures from two sporidia, properly selected, can cause normal infection which finally results in the production of new spores. This means that what corresponds to sex exists in these smut fungi and that proper mating is necessary for reproduction. This mating is similar in its results to pollination or the union of sex cells in such plants as wheat and corn. When different strains of such higher plants are cross-pollinated, progenies result which differ from either parent, but combine parental characteristics in different ways. Some of these new hybrids also may possess characteristics not apparent in either parent. The same thing happens with the stinking-smut fungi.

Hybridization is Possible

Careful experiments have demonstrated that hybridization is possible between the different strains of each of the two species of bunt and also between the two species themselves. As spores of both species are commonly found in the same wheat field, and, after threshing, even on the same wheat seed, it is probable that hybridization occurs in nature. This may account, at least in part, for the development of new strains of bunt and for the infection of varieties of wheat previously considered resistant. The appearance of new strains emphasizes both the difficulty of maintaining the resistance of a wheat variety to bunt and the desirability of thoroughly disinfecting new seed from outside sources to avoid introducing new smut strains.

H. H. Flor, *Bureau of Plant Industry.*

WHEAT Growers in Central Great Plains Use Three Main Tillage Methods

Three general methods are used in growing winter wheat in the central Great Plains—by continuous cropping, on fallow, and in rotation with other crops. There is a close relation in this section between the quantity of moisture in the soil at seeding time and the yield, and consequently the methods of seed-bed preparation that are most efficient in storing moisture are likely to be the most successful.

When continuous cropping is to be practiced, it is very important to begin tillage work at the earliest possible date after the crop is removed. Timeliness of the first tillage operation is of more importance than the implement chosen for the work, provided it is a good one and is operated at a reasonable depth.

For the first operation in the preparation of wheat-stubble land for wheat, both the plow and the lister have given good results. The latter has given slightly the higher yields, and following its use the surface resists soil blowing a little better.

The 1-way disk and the Killifer chisel have not been used long enough in this section for their value to be fully determined. For three years at the Fort Hays branch station, Hays, Kans., these implements, when used at the same time and depth, have compared favorably with the plow and the lister.

Where such implements as the plow, 1-way disk, or chisel are used to a depth of 5 or 6 inches, the subsurface soil packer is a valuable aid in the preparation of a seed bed. It breaks up the larger clods, closes

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or makes smaller the air pockets in the furrow slice, and retards the loss of water by evaporation. It also firms the soil over the straw and shattered wheat, keeping both damp for a longer period, thus accelerating decay of the straw and germination of the seed.

Where the lister is used, the furrows are left open until there is sufficient volunteer wheat or weed growth to justify tillage. The furrows are then leveled with a ridge "buster" or any implement that will do similar work. If there be another growth of vegetation before seeding time, a surface working with the disk or a shallow cutting with the 1-way disk generally makes a satisfactory seed bed. If there be not sufficient moisture after listing to start volunteer growth by the latter part of August, the furrows should be leveled at that time, as it is not best to leave them open too late in the fall or too near seeding time.

Methods of Handling Fallow

Where the time between the maturity of one crop and the seeding time for the following crop is too short for the storage of a considerable quantity of moisture, fallow generally produces better results than continuous cropping. There are numerous methods of handling fallow. It is not only more economical but gives as satisfactory results to leave the ground in stubble over winter, beginning work the following spring. The ground may then be plowed and thereafter surface worked as may be required to prevent vegetative growth; or it may be listed and later relisted, splitting the ridges, and then be leveled with the ridge "buster" and thereafter surface worked as required. If there is an early growth of spring vegetation, the ground may be disked or 1-way disked and the plowing or listing be delayed until in May. Plowing or listing just before the period of expected heavy rainfall prepares the ground to absorb the maximum amount of the rains.

When wheat is grown in rotations, if it follows a small-grain crop, the same method of preparation may be employed as is used in the preparation of wheat-stubble land in continuous cropping. If the wheat follows corn that has been well cultivated, it may be drilled among the stalks, or if the corn be harvested the ground may be shallowly 1-way disked. If the ground be loose and free from weeds, equally good results may be secured by drilling-in the wheat without any tillage.

Regardless of the seed-bed preparation, there should be sufficient surface tillage to prevent vegetative growth. Implements that will leave the surface slightly rough and cloddy should be selected for this tillage, so far as possible. This prevents soil blowing and favors the absorption of water.

A. L. Hallsted, *Bureau of Plant Industry.*

WHEAT in U. S. Attacked By Three Smuts, Two of Them Widely Distributed

Wheat is attacked by three smuts: Stinking smut (bunt), loose smut, and flag smut. Stinking smut and loose smut are widely distributed in all wheat-growing areas in the United States, while flag smut is known to occur only in a limited territory.

Stinking Smut

Estimates made by the Department of Agriculture in cooperation with officials of various States indicate that owing to stinking smut or

or makes smaller the air pockets in the furrow slice, and retards the loss of water by evaporation. It also firms the soil over the straw and shattered wheat, keeping both damp for a longer period, thus accelerating decay of the straw and germination of the seed.

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Stinking Smut

Estimates made by the Department of Agriculture in cooperation with officials of various States indicate that owing to stinking smut or

bunt there is an annual reduction of more than 18,000,000 bushels in the wheat crop of the United States. The estimated annual field losses from stinking smut are given in Figure 146.

As indicated by its common name, this smut gives off a foul, fishy odor. When the smut is present in wheat to any considerable extent, this odor permeates the entire mass, and the smut and odor can be removed only by special cleaning and washing. The cost of this cleaning and washing is reflected back to growers through discounts or in some sections by a generally lower price for all wheat. Discounts may run from 3 to 10 cents or even more per bushel. To losses in yield, therefore, must be added the market discounts for smut, which may range from $45 to $180 per carload, depending upon the amount of smut. Taken together, the field and market losses from stinking smut of wheat, even at moderate wheat prices, amount to well over $15,000,000 annually in the United States.

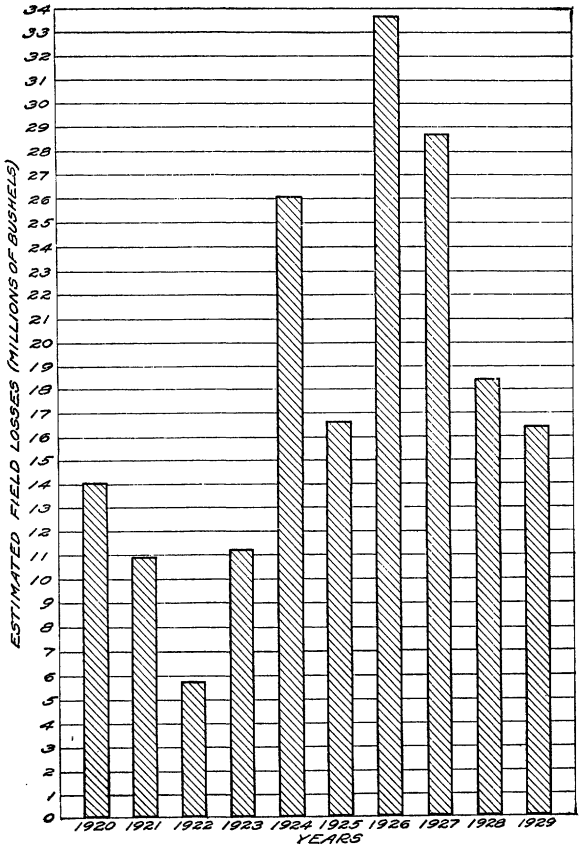

FIGURE 146.—Estimated annual field losses from stinking smut of wheat in the United States from 1920 to 1929, inclusive

Survey in Four States

In 1930 a cooperative survey in four wheat-growing States showed an average loss in yield of 2.8 per cent from stinking smut. This loss, together with market discounts, represented a total loss from smut of about $5,000,000 to the wheat farmers of these States alone.

In one county in Nebraska, where detailed records were kept from 1926 to 1930, it was found that stinking-smut losses averaged $237,590 annually. In 1930 the loss from this disease on 1,000 farms in that county averaged $276.87 per farm, or considerably more than the average annual taxes on the 1,117 farms in the same county. If surveys could be made in all wheat-growing areas, it is likely that similar losses would be found in other States.

Data from five terminal markets show that 23.1 per cent of all the cars received at these markets were graded smutty in 1928. The following year this percentage was 25.3, and during the first three

months of 1930 the percentage was 31.1. It appears, therefore, that losses from this wheat disease are increasing.

Recent experiments have demonstrated that the field loss from stinking smut is directly proportional to the percentage of smutted grains. The smut replaces grain that would have been produced without additional cost to the farmer. Further, it was found in the survey previously referred to that about 1 per cent or more of smutted heads in the field makes the threshed wheat grade smutty at the elevator. The clean wheat is contaminated by smut in threshing, and the entire crop is subject to a market discount if enough smut is present. It costs the grower about as much to produce an acre of smutty wheat as to produce an acre of clean crop, but he gets a lower return in both yield and price. Eliminating smut from the wheat crop is a direct gain to the farmer.

Loose Smut

Loose smut of wheat causes an estimated annual loss in the United States of about 10,000,000 bushels. The extent of these losses is not often realized, because the smut on the heads is noticeable for only a few days before it blows away. At harvest time there remains only the naked central stalk of the head at the top of the straw.

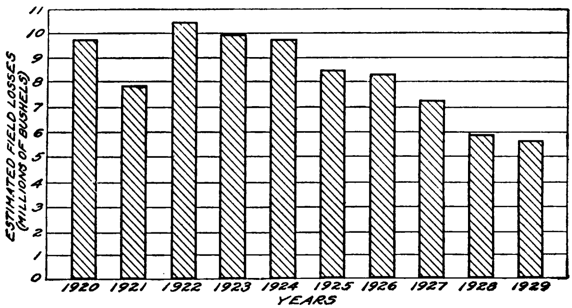

FIGURE 147.—Estimated annual losses from loose smut of wheat in the United States from 1920 to 1929, inclusive

While this smut occurs in all parts of the United States, it is rather rare in the arid Western States. On the other hand, loose smut is rather destructive in the more humid eastern wheat-growing regions, where it causes losses of as much as 40 per cent in some fields. The estimated annual losses from loose smut in the United States for the 10-year period 1920–1929 are shown in Figure 147.

Losses from loose smut are a direct reduction of the field yield, due to a reduction in the number of sound heads of grain. In addition, it has been found from field experiments that wheat plants infected with loose smut winterkill more easily than uninfected plants.

Flag Smut

Flag smut was found in the United States in 1919, near Granite City and East St. Louis, Ill. Later observations have revealed its presence in several counties in Illinois and Missouri in the vicinity of St. Louis and in several counties in Missouri and Kansas near Kansas City. It is known to occur still in these areas of all three States.

In the United States losses from flag smut have been heavy only in individual fields of Harvest Queen wheat, which is very susceptible to this smut. In such fields, losses as high as 30 per cent have occurred. In resistant varieties the losses have been low. In some sections of Australia, flag smut destroys from 5 to 70 per cent of the plants in in-

fested fields. Both in Australia and in the United States flag smut is able to live in the soil from one crop to the next when wheat follows flag smut infected wheat. Under these conditions seed treatments do not prevent infection.

While the areas infested with this disease in the United States are localized near the two original centers, there is no assurance that infected straw or seed may not be taken into other wheat-growing localities through the channels of commerce and thus spread the disease. The greatest danger from flag smut in the United States is in its possible spread to the more arid Western States, where susceptible varieties of wheat are grown under climatic conditions favorable to the disease, and where continuous wheat culture is practiced. There is also the menace of this smut spreading to uninfested sections, particularly in Kansas and Oklahoma, where Harvest Queen is the principal wheat variety.

The seriousness of the wheat smuts as factors affecting the economy of production must not be minimized. Even with limited infections the aggregate loss in the entire crop of the country is enormous. Most of this loss can be prevented by control measures.

J. A. Faris, *Bureau of Plant Industry.*

WHEAT Loose-Smut Infection Prevented By Arid Climate Loose smut of wheat, commonly called "smut" or "blackhead," is different from stinking smut and flag smut, the other smuts of wheat. This smut is very noticeable just as soon as the wheat heads out. (Fig. 148.) The diseased heads are almost completely destroyed by the smut. Instead of normal wheat chaff and flowers, black masses of smut, composed of the spores or "seeds" of the smut fungus, appear along the central stalks of the heads. The spores are easily shaken from the smutted heads, and very soon after heading the latter appear as bare stalks only. The spores may be carried for long distances by the wind or by insects or other agencies. This distribution of loose-smut spores takes place most abundantly at about the time the healthy wheat is in bloom. Some of the spores may lodge between the glumes or chaff of the sound wheat heads, where they germinate and grow into the very young wheat kernel inside the chaff. The smut fungus lies dormant in the mature kernel, but it resumes growth as the kernel germinates and spreads upward into the tender tissues of the developing wheat plant. Finally, when the wheat heads form, the fungus invades them and entirely destroys everything but the central stalk, masses of dustlike black spores taking the place of the flowers.

As the fungus is carried inside the seed, surface disinfectants that control stinking smut and other surface-borne smuts will not control loose smut. To be successful, a treatment must penetrate and kill the fungus without killing the seed. The hot-water treatment meets these requirements, but it is so difficult to apply that it is rarely used. Furthermore, it frequently causes some injury to germination. The most that can be expected from the hot-water treatment is the cleaning up of enough seed for a clean seed plot to serve as a source of seed for a larger area.

fested fields. Both in Australia and in the United States flag smut is able to live in the soil from one crop to the next when wheat follows flag smut infected wheat. Under these conditions seed treatments do not prevent infection.

While the areas infested with this disease in the United States are localized near the two original centers, there is no assurance that infected straw or seed may not be taken into other wheat-growing localities through the channels of commerce and thus spread the disease. The greatest danger from flag smut in the United States is in its possible spread to the more arid Western States, where susceptible varieties of wheat are grown under climatic conditions favorable to the disease, and where continuous wheat culture is practiced. There is also the menace of this smut spreading to uninfested sections, particularly in Kansas and Oklahoma, where Harvest Queen is the principal wheat variety.

The seriousness of the wheat smuts as factors affecting the economy of production must not be minimized. Even with limited infections the aggregate loss in the entire crop of the country is enormous. Most of this loss can be prevented by control measures.

J. A. Faris, *Bureau of Plant Industry.*

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Control by Dry-Air Conditions

Recent studies in cooperation with the Idaho Agricultural Experiment Station have shown that, in the arid regions of the West, loose smut in wheat is controlled in nature by dry-air conditions when the plants are in bloom. This is the period when inoculation normally takes place, the smut dust or spores being blown from heads. Because of insufficient moisture in the air, the smut spores are unable to germinate in the flowers and infection does not take place. This relation to moisture in the air accounts for the prevalence of loose smut of wheat in the humid parts of the country and under irrigation, and for the rare occurrence of this disease in the dry-land areas of the West.

FIGURE 148.—The appearance of loose smut in wheat (right) when the sound heads (left) are in bloom

The only feasible method of controlling loose smut in the areas where it is serious is the use of seed free from infection. The alternative of the hot-water treatment is special seed plots protected against infection, the clean seed for these plots being either treated with hot water or obtained from an area known to be free from the disease. The difficulty of the hot-water treatment even on a small scale makes preferable the seed from a known disease-free source.

In the case of varieties grown in both humid and arid areas, disease-free seed should be easily obtainable. Where the humid-area variety can not be obtained from arid sources, arrangements might be made for specially growing the pooled requirements of a number of farmers. Handled through a county farm bureau, a county agent, or other similar agency, a satisfactory arrangement could be made at a reasonable cost. The knowledge of humidity requirements governing infection also should make it possible to adjust irrigation practice in irrigated areas so as to effect natural control.

V. F. Tapke, *Bureau of Plant Industry.*

WHEAT Loss from Stinking Smut Can Be Reduced by Disinfecting the Seed

Serious losses from bunt or stinking smut in wheat can be prevented by properly cleaning and treating the seed before sowing, except in the dry-farming regions of the Pacific Northwest and possibly in other areas where the soil may be infested with bunt spores. In such areas, while seed treatment does not entirely prevent bunt, it greatly reduces it. Bunt under these conditions may be combated by a combination of seed treatment, cultural practices, and the use of immune or highly resistant varieties. Fortunately, soil infestation is

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serious only in a relatively small part of the great wheat-growing area of the United States. Seed treatment, therefore, may be recommended generally as a wise farm practice.

Cleaning the Seed Important

Seed wheat should be very thoroughly cleaned before any kind of seed treatment is applied. Nearly all wheat as it comes from the threshing machine contains foreign material, weed seeds, other grains, and some small, shriveled wheat kernels unfit for seed. If the crop is smutty, the wheat also will contain many smut balls. Good practice demands that these materials be removed from the wheat before it is treated or sown. It is doubly important to remove the smut balls before treatment; otherwise the seed treatment is much less effective. (Figs. 149 and 150.)

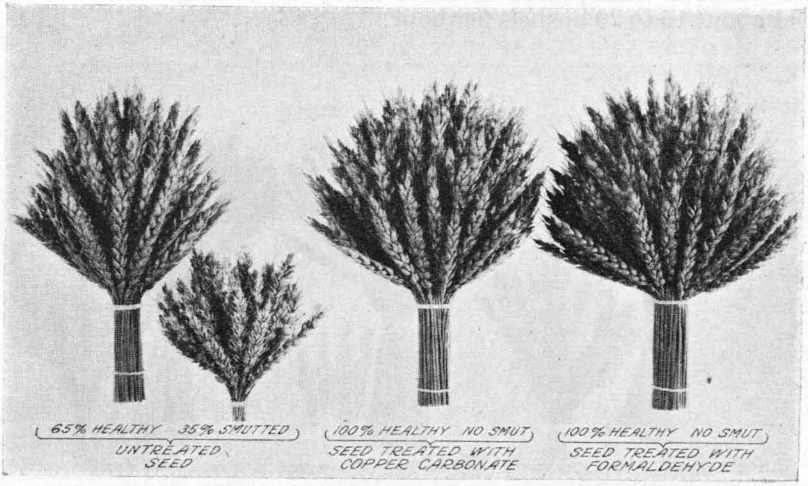

FIGURE 149.—Wheat from seed with smut balls removed before treatment

What Treatments to Use

After the seed wheat has been thoroughly cleaned and smut balls removed, it is ready for treatment. There are two methods of treating seed grain now in general use—the dry or dust method, and the wet or formaldehyde method.

The Dry Method

The chief advantages of the dry method are: (1) It is easy to apply; (2) it does not cause seed injury, even when the treated seed is stored for weeks after treatment; and (3) it protects treated seed from weevils and rodents.

Copper carbonate is the most widely used and, on the whole, the most satisfactory dust fungicide now on the market for controlling bunt. There are two forms in general use—the pure copper carbonate containing about 50 per cent metallic copper, and various diluted or extended brands containing from 18 to 30 per cent metallic copper. The former should be used at the rate of 2 ounces per bushel of seed and the latter at from 2½ to 3 ounces per bushel.

Copper carbonate should be applied to the seed with a machine that thoroughly coats every kernel with the dust. The dust should never be applied by mixing it with the seed on the barn floor or in a wagon box by means of a shovel, or by stirring it into the seed by hand in the drill box. Such methods result in improper treatment and failure to control bunt.

The most common method of applying copper carbonate to seed wheat on the farm is by means of the common homemade barrel type of duster, which is very effective if properly constructed and used. Directions for making an inexpensive duster of this type may be obtained by writing to the United States Department of Agriculture. The barrel mixer is filled to not more than one-third of its capacity with the thoroughly cleaned seed wheat, the proper amount of dust distributed from one end of the barrel to the other, and the mixer turned for about two minutes at the rate of about 30 revolutions per minute. The wheat is then placed in sacks ready for sowing. Two men can treat about 15 to 20 bushels per hour.

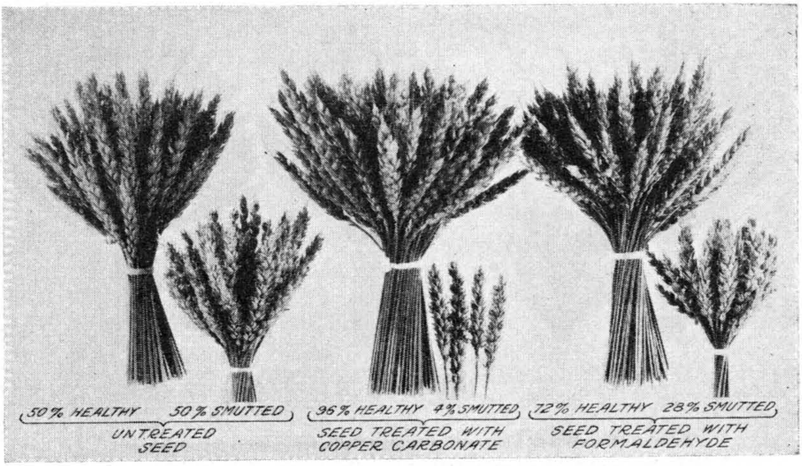

FIGURE 150.—Wheat from seed with smut balls not removed before treatment

For dusting large quantities of seed, there are on the market a number of commercial power dusters with capacities for treating from 30 to 300 bushels of wheat per hour. Some of these can be combined with power cleaners so that both the cleaning and treating are done in one operation.

In some localities wheat can be effectively cleaned and treated for a reasonable charge at a mill or elevator well equipped for that purpose. In several sections of the country portable combination cleaners and dust treaters, which go from farm to farm, have been very successful.

The Wet Treatment

Formaldehyde solution is the liquid most commonly used in the wet treatment of wheat for bunt control. Before or during seed treatment with formaldehyde all smut balls must be removed from the seed if the treatment is to be effective. The formaldehyde solution does not penetrate the oily material of the smut balls and therefore does not

kill the spores in them. In handling the grain after treatment these smut balls are broken and the seed is again infested with viable spores. The formaldehyde treatment does not protect the grain from this recontamination as copper carbonate does to some extent. (Figs. 149 and 150.)

The only thoroughly effective way of treating bunt-infested wheat with formaldehyde is by soaking the seed in an open container in a 1:320 formaldehyde solution made by mixing one-half pint of commercial formaldehyde in 20 gallons of water. The well-cleaned seed wheat is poured slowly into the solution and stirred at the same time so that any remaining smut balls may rise to the surface and be skimmed off. After the wheat has been in the solution for about 10 minutes, the solution is drained off and the treated seed spread out on a clean floor or canvas to dry. When sufficiently dry, it should be placed in clean sacks and sown at once. Sacks previously used for smutty wheat should be soaked in the above solution before being used for treated seed. It is well also to wash out the drill box and spouts with the same solution before sowing treated seed.

Removal of Smut Balls Essential

Soaking the seed in sacks in this solution, sprinkling or spraying the seed with a more concentrated solution, or any other method of applying the formaldehyde treatment that does not include removing the smut balls, usually results in poor bunt control unless the smut balls have been completely removed in cleaning the seed. For the farmer who has much seed to treat with formaldehyde, there are machines on the market for this purpose. Before purchasing a machine, however, he should be certain that it thoroughly wets every kernel with formaldehyde and that it removes the smut balls.

If the smut balls can not be completely removed by available cleaning equipment, it is usually advisable to procure seed wheat that does not have smut balls in it. Such seed wheat also should be treated before sowing, because there might be smut spores on the seed even though no smut balls are evident. It is good insurance to treat the seed every year. Badly smutted wheat should not be used for seed at all.

R. W. Leukel, *Bureau of Plant Industry.*

WHEAT Strains Resistant to Flag Smut Afford Best Means of Control

Flag smut appears in the wheat plants in spring as dark-colored stripes running lengthwise in the leaf blades and sheaths. (Fig. 151.) These stripes are first gray in color, and later become black. They are filled with dark-colored spores or "seeds" of the fungus parasite. Infected plants rarely produce normal heads. Spores from these infected plants may become attached to wheat kernels in harvesting and threshing or may fall on the soil. They may be blown by the wind or carried by water or by other means, such as threshing machines or other farm implements, men, or animals, for considerable distances from the infected plants. When smutted wheat is sown or when clean seed is sown in infested soil the smut spores germinate when the wheat germinates, and the young wheat seedlings are penetrated by the minute threadlike germ tubes of the fungus. After entering the seedling

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these fungus threads grow up through the tissues of the wheat plant from which they obtain their food. They live in the plant until spring, when they begin to produce the dark-colored spores that are seen as black stripes in the older wheat plant.

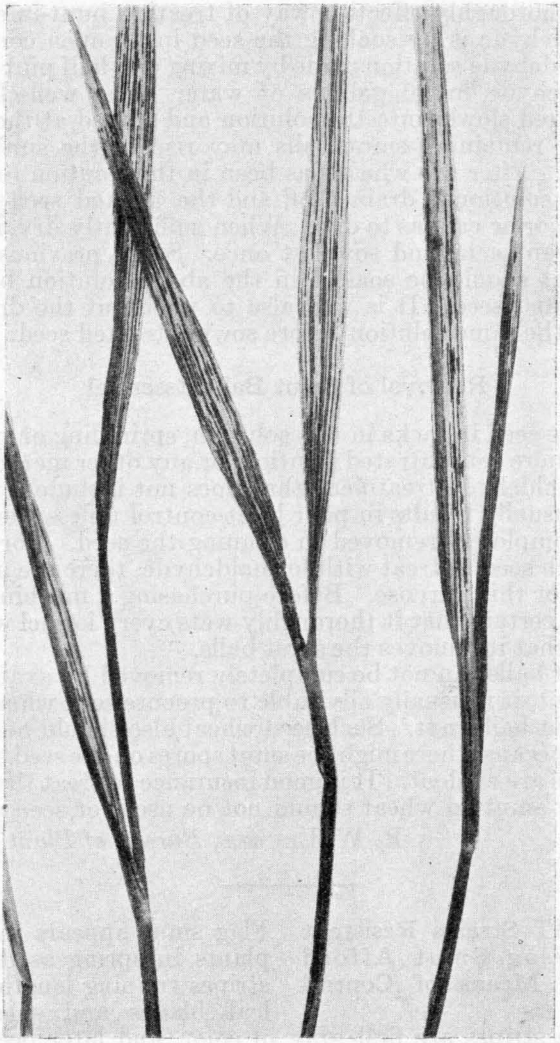

FIGURE 151.—Leaf blades and sheaths of wheat plants showing the black stripes caused by flag smut

Control Measures

Flag smut may be held in check and reduced in quantity by judicious quarantine, seed treatment, crop rotation and other sanitary measures, and by growing resistant varieties of wheat. The percentage of infection is also influenced by soil and weather conditions at the time the wheat is sown. Quarantine and sanitary measures include the regula-

tion of shipments of infected grain and straw; the disinfection of farm machinery, etc., when leaving an infested area; the burning of straw; and the treatment of seed grain. On account of the limited occurrence of flag smut in the United States, a Federal quarantine has been placed against the importation of wheat from all foreign countries where flag smut is known to occur.

Seed Treatment

Seed treatment will destroy the spores of flag smut carried on the seed. The copper-carbonate dust treatment recommended for controlling stinking smut or bunt of wheat is the most satisfactory treatment. However, none of the seed treatments prevents infection of wheat seedlings by flag-smut spores present in the soil.

Sanitary Measures

Because flag-smut spores easily survive in the soil from harvest to seeding time and are present to infect fall-sown wheat, it is especially important that infested fields be sown to other crops the following year unless a resistant wheat is used. The continuous growing of susceptible wheat on infested land may result in an increase of the disease, as has been found in Australia. Flag smut affects only wheat, therefore any other crop may be grown in the rotation with safety.

Any material that may contain flag-smut spores, such as straw or manure, may serve as a source of infestation when applied to the land. For the best results infested crop residues and infested manure should not be returned to soil that is to be sown to wheat within a year. The safest place in the rotation to apply such material is on the wheat stubble before a crop other than wheat.

Resistant Varieties

The use of resistant varieties promises to be the most satisfactory means of controlling flag smut. Among the resistant wheats available in commercial quantities for growing in the flag-smut area are Shepherd, Trumbull, Gladden, and Fulhio. A few resistant selections of Harvest Queen have been found, but these are not yet increased for distribution. There are other highly resistant wheats that are less adapted to the infested area. The susceptible wheats that are grown commercially in the infested area and that should not be sown there are Flint (May), Fultz, Harvest Queen (Salzer Prizetaker, Red Cross), Jones Fife, and Red Wave. If these susceptible varieties are replaced by resistant varieties that do well in the infested area, serious losses from flag smut should be eliminated.

V. F. TAPKE, *Bureau of Plant Industry.*

WHEATS Bred for Smut Resistance Combined with Yield and Quality

Differences in the reaction of varieties of wheat to smut or bunt have been recognized since 1901. An almost complete range from immunity or strong resistance to complete susceptibility has been obtained among different varieties. Smut is more injurious to winter wheat than to spring wheat, but since the distribution of certain new varieties, it is becoming more prevalent in spring wheat.

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The two species of bunt and strains within each species have complicated the testing of the reaction of wheat varieties. Based upon the infection of different varieties, there appear to be greater differences between some strains of smut within a species than between the species themselves. Martin and Hussar, winter-wheat varieties, were immune from smut in many experiments but recently have been found to be very susceptible to certain strains of smut occurring in the Pacific Northwest. Outside of this section different strains of smut have not become a serious problem to the wheat breeder. Some varieties, such as Oro and Ridit (selected and bred at the Oregon and Washington experiment stations), and Hope (developed in South Dakota) are resistant to almost all of the known strains of smut. Other varieties are resistant to one or more strains of bunt, while still others are susceptible to all known strains. Outstanding among varieties resistant to some strains are Sherman and Regal, hard red winter wheats selected for bunt resistance and distributed from the Sherman County branch station, Moro, Oreg., and Albit, which was developed by hybridization at the Washington Agricultural Experiment Station. Marquis, the principal commercial variety of hard red spring wheat, has some resistance to bunt, and probably less serious losses have occurred in spring wheat than if other varieties had been generally grown in its place. Less smut has been obtained in Hope spring wheat than in Marquis or any other spring variety.

Smut reaction has been studied in numerous wheat crosses involving immune, resistant, and susceptible varieties. The immunity from some strains of bunt possessed by the two winter wheats Martin and Hussar has been found to be inherited in a rather simple manner. In crosses between other varieties the inheritance is more complex and the difficulties of the plant breeder are therefore considerably greater. Aided by an increasing knowledge of the mode of inheritance of bunt reaction in crosses, breeders are producing new wheat varieties which are immune from or resistant to the disease.

Important commercial varieties have been crossed with immune and resistant varieties in order to combine this smut reaction with other desirable characters such as high yield, rust resistance, and good milling and baking quality. Many hybrid strains thus developed are now being tested for yield and quality and for resistance to bunt. Some of the bunt-resistant varieties already developed, particularly Ridit, are grown to a considerable extent on farms. The development and growing of resistant varieties is a promising method of smut control, particularly for those areas where soil infestation reduces the effectiveness of seed treatment. However, when resistant varieties are grown, seed treatment should be practiced every few years to control infection in susceptible mixtures in the variety or the increase of any virulent new form of smut.

J. ALLEN CLARK, *Bureau of Plant Industry.*

WHEAT'S Deterioration in Farm Storage Bin Tested Experimentally

The principal reason for wheat's going out of condition while in storage is high moisture content. This moisture content can be estimated to some extent by the way the grain threshes and handles. If the grain threshes or combines easily, rattles when handled, and is hard to bite, it

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probably is safe for storage. If the weather has been hot and dry, it is a good indication that the wheat is dry. While in storage the grain should be examined from time to time for odor, temperature, and weevils.

When wheat goes out of condition, the germination is decreased, the rancidity—which is a measure of soundness—is increased, and the grain becomes musty, sour, and hot. Grain in this condition is unfit for making flour. Wheat in various stages of deterioration adds to the problem of marketing. The difficulties in grading during the years of wet harvest seasons are greatly increased.

During the summer of 1930 about 100 bushels of damp wheat containing approximately 17 per cent of moisture was placed in a small farm-storage bin at Arlington farm, an experimental farm of the department near Washington, D. C. The bin was equipped with electrical resistance thermometers, so that the temperature in its various parts could be determined.

The average temperature of the wheat on August 22, when the wheat was placed in the bin, was 78° F. For several days the temperature of the wheat varied somewhat according to the temperature of the outside atmosphere. Fifteen days after the wheat was placed in the bin the temperature of the wheat, 1 foot below the surface, was 101°. Six days later the temperature at that point was 122°. It took 14 days for the temperature of the wheat in that part of the bin to increase from 78° to 101°, an increase of 23°. Six days later the temperature was 122°, an increase of 21°. The temperature of the rest of the bin compared with that of the top portion.

The germination of the wheat at the beginning of the storage experiment was 97 per cent. On September 15, at the end of the test, the germination was 69 per cent for the top portion of the grain. Wheat from the center of the bin germinated 11 per cent and at the bottom showed no germination at all.

The rancidity of the wheat was represented by an index figure of 7.32 at the beginning of the storage experiment. The rancidity index at the close of the experiment was 13.22 at the top of the bin, 24.88 in the center, and 26.27 at the bottom.

The moisture content of the top of the grain on August 22 was 16.5 per cent and decreased to 14 per cent at the end of the experiment. The damage was not so great at the top of the bin, due to the drying of the wheat in this position.

Drying the Damp Wheat

On September 17 the wheat was taken from the bin and placed in the open air on a platform about 20 feet square. The wheat covered approximately one-half of the platform, which gave room for turning.

The average moisture content of the wheat, when it was placed on the platform, was 16.3 per cent. Eight days later the average moisture of the wheat was 14.5 per cent. The top 2 inches had a moisture content of 12 per cent. The wheat was handled on September 18, 19, 20, and 22; twice on September 26; and once on September 30. On October 1 the top 2 inches of wheat had a moisture content of 12.1 per cent and the average for the pile was 13.6 per cent. On October 23 the moisture content of the top 2 inches was 11.3 per cent and the average of the pile was 13 per cent.

There was practically no rainfall and the humidity of the atmosphere was low during the drying period. If there had been rainy weather with high humidity during this period, or during a part of the time, the drying would have been slowed to some extent.

The practice of spreading grain to dry is common with farmers. In some years when the prices are low and the farm has no storage space, sound, dry wheat is piled on the ground. Wheat stored in this manner for any length of time is usually badly damaged. This damage lowers the grade and the price of the wheat, and causes many marketing complications.

This experiment corroborates what is generally known. It is always best to have the wheat dry enough for storage before it is threshed or combined. Sometimes it is impossible to do this because of a wet season. During such a year every agency is taxed to the limit to put the wheat crop into proper condition for storage. It is possible to dry some of this wheat by piling it on a platform and exposing it to the sun and wind. The wheat must be handled in order to dry it properly, and must be kept covered with a canvas during rains.

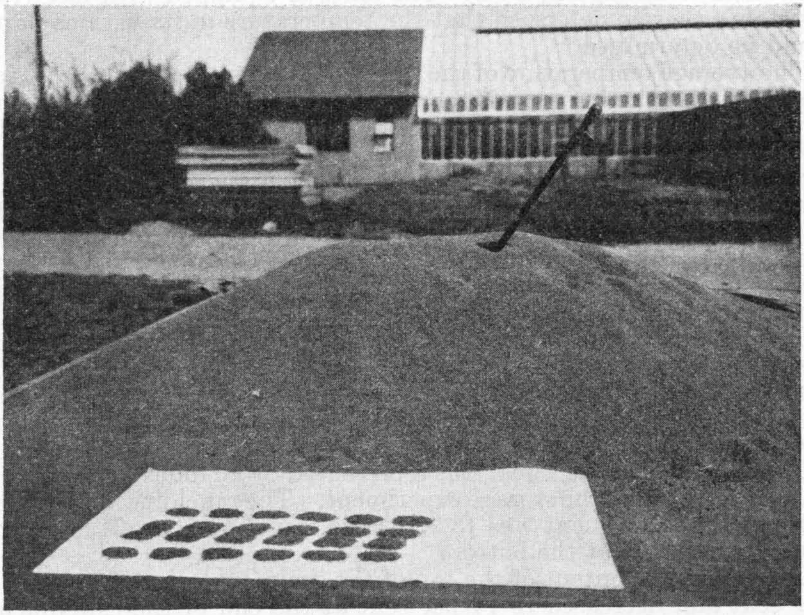

FIGURE 152.—Pile of wet wheat in the open, showing grain trier, sampling cloth, and grain from four probes on the cloth

JOHN H. COX, *Bureau of Agricultural Economics.*

WILTSHIRE Sides for Export Should Meet English Requirements English butchers do not cut up a hog carcass into such common American cuts as fresh pork chops, picnic shoulders, and butts. (Fig. 153.) They merely remove the shoulder blade, the back, the neck and aitch bones, and put the entire side of pork in cure.

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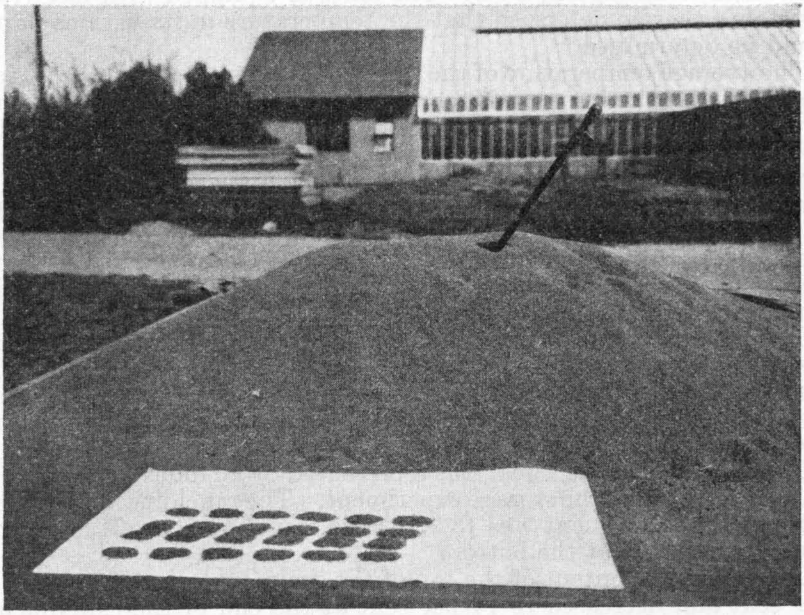

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When these cured, smoked "Wiltshire sides," as they are called, are cut up for the English retail trade, the butcher prepares the primary cuts illustrated in Figure 154, then slices off portions of these for his trade as required. The slices are usually thick and may contain portions of the spare ribs, back fat, plate, ham, skin, or other product, depending upon the part of the carcass from which they are taken. A slice of English bacon cut across the loin includes: A portion of the belly, a chop, as we know it in the United States; a portion of back fat; and a section of skin.

Imagine an Englishman's dismay if he should buy a slice of untrimmed loin from a typical well-fattened American lard-type hog. His purchase would consist of about one-third lean, one-half fat, and the rest bone and skin. Exporting that kind of Wiltshire side to England would probably be as unprofitable as trying to sell untrimmed pork chops in this country.

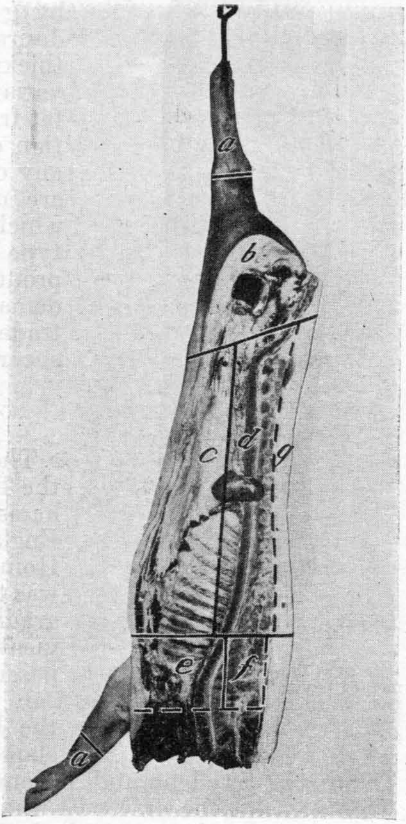

FIGURE 153.—Side of hog showing standard cuts in the United States: *a*, Feet; *b*, ham; *c*, bacon; *d*, loin; *e*, picnic shoulder; *f*, shoulder butt; *g*, back fat

In the United States consumers are less directly concerned with the type of hog. Excess fat on the loin is normally trimmed off by the packer. Frequently that on the ham and shoulder and sometimes that on the bacon are also trimmed off. In England the consumers buy the bacon as it is and protest justly if there is too great a proportion of fat. This has led producers catering to the English market to breed and feed a type of hog that will produce a Wiltshire side with a desirable proportion of lean to fat. This means that the loin must be covered with a moderately thick, even layer of fat. The carcass must be such that a slice of English bacon will be attractive, economical, and not wasty to the consumer. (Fig. 155.)

Wiltshire Sides of Five Countries Compared

American hog producers can meet the requirements of type and finish if they wish to do so. Evidence of this is shown in an importation by the United States Department of Agriculture of 20 Wiltshire sides from the Liverpool market. These sides originated, four in each of the following countries: Denmark, Ireland, Sweden, Poland, and the United States.

These 20 sides were fairly uniform in length but differed considerably in width, thickness of fat over the back, and in thickness and

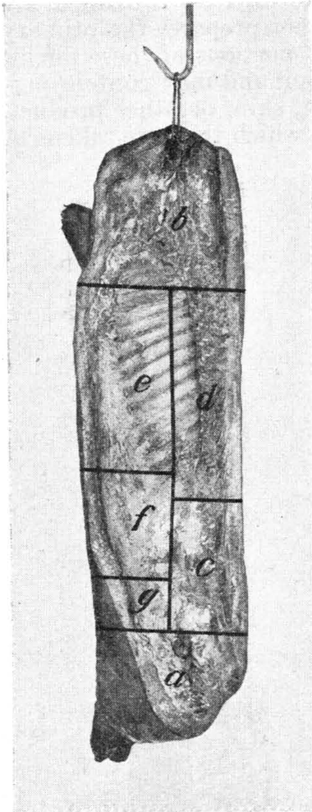

FIGURE 154.—Wiltshire side with method of cutting indicated: *a*, Gammon; *b*, fore end; *c*, long loin; *d*, back bacon; *e*, thick streak; *f*, thin streak; *g*, flank

proportion of fat in the cuts. The back-fat thickness had a definite influence on the bacon grade, the fatter sides being graded lower by the foreign graders.

The best American sides in the shipment compared favorably in quality with those from other countries, as indicated by general appearance, and possessed desirable back fat with respect to average thickness. They showed the greatest variation, however, in thickness of back fat from shoulder to ham. The proportion of lean to fat was as desirable as in any of the other sides. Doubtless there are many market hogs in this country which do not show such desirable export type and finish, but suitable hogs can be produced by those who understand the demands and methods of the English trade and adapt their production methods accordingly.

Cooked Meat Tests

These 20 imported sides were cut into the English retail cuts and the loins and hams (gammons, as hams are called in England) were roasted at the Bureau of Home Economics. The cooked meat was tested for palatability by the official grading committee of the department's meat research staff. It is of more than passing interest to note that the American pork, with particular reference to the loins, was almost unanimously declared to be too salty. Loin samples from Denmark, Sweden, and Ireland were milder and more desirable. This was not the case with the gammons. The American gammons were graded a close second, the Danish being slightly more desirable.

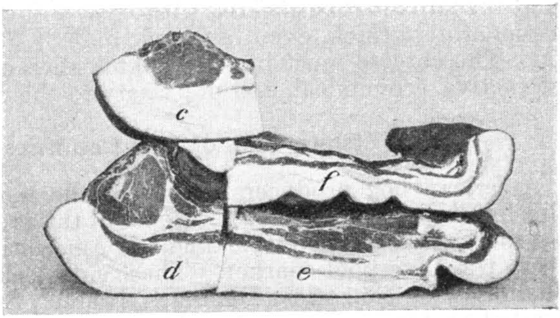

FIGURE 155.—Distribution of fat and lean in primary Wiltshire cuts: *c*, Long loin; *d*, back bacon; *e*, thick streak; *f*, thin streak. (Cuts are designated with same letters as in fig. 154.)

The fact that the most lightly cured Wiltshires had remained sound during shipment from the respective countries of origin to England and from England to the United States suggests that a milder cure than that found in the four American sides returned from Liverpool could be used in American sides for exportation to the English market.

From observations made on these imported Wiltshires, it would appear that the type of hog necessary for the production of satisfactory Wiltshires closely approaches the type which will produce the most desirable American cuts. Whether the swine grower is raising hogs for export or for the domestic trade, he will find that those possessing quality and a relatively high proportion of lean to fat will find greatest favor at the market. The problems of breeding, feeding, and management must be studied in their relation to the practical production of quality pork whether the final product is to be exported or used at home.

R. L. HINER, *Bureau of Animal Industry.*

WOODLANDS on Farm an Important Factor in Timber Survey The farmer owns nearly one-third of all the forest land in the United States. (Fig. 156). But what do the farmer's acres contribute to the total timber supply of the country? How rapidly are his woods being reduced by cutting, tree diseases, insect attacks, fire, grazing, and other means? How much of his timber does the country need? Is the farmer getting full value from his wood lot now, and can he get more?

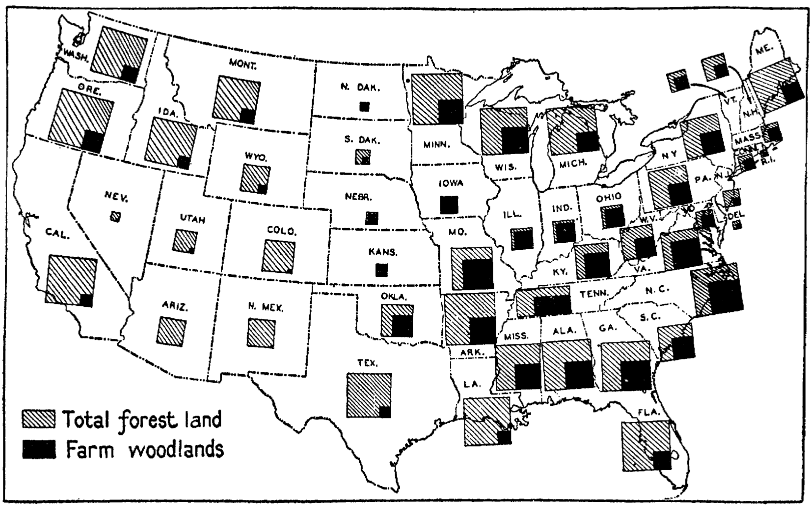

FIGURE 156.—The farmer as a timber owner

These are a few of the questions comprised in the one big question: "What are this country's actual timber resources and how do they actually meet present and future needs?" This question has never been answered accurately for the country as a whole, or even for any one State. Forest-conservation policies and practices have been based largely on rough and unreliable estimates, because a census or survey of the country's forest resources and timber needs, broad enough to furnish facts instead of guesses, is a project involving years of effort and millions of dollars.

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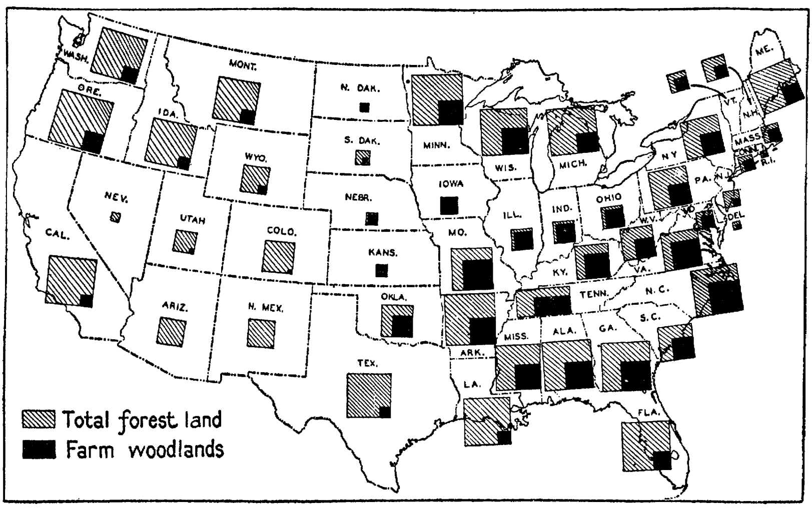

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Agriculture to spend $250,000 a year for 12 years, in cooperation with the several States—

in making a comprehensive survey of the present and future requirements for timber and other forest products in the United States, and of timber supplies, including a determination of the present and potential productivity of forest land therein, and of such other facts as may be necessary in the determination of ways and means to balance the timber budget of the United States.

Survey Well Under Way

The forest survey thus authorized is now well under way. Briefly, it follows four lines of investigation: Stand, depletion, yields, and requirements. First, how much timber has the United States now standing—in mature saw timber, in cordwood, and in young growth coming in on burned or cut-over forest land? Then, how fast are forest use and forest enemies reducing present stands? To balance against the answer to that question, there must be accurate figures showing how fast the present forests are growing—how much wood is grown each year to counterbalance use and loss, and how much might be grown with adequate fire protection and forest management? Finally, how much wood does the United States need, and are its needs increasing each year or lessening? In short, is this country facing a timber shortage or shall it have, as some claim, more than enough wood for all future needs?

The farmer is not only a large timberland owner, and therefore a potential producer of a considerable part of the country's timber supplies, he is also a large consumer of lumber and cordwood. From the survey he will learn a great deal about the location, extent, and character of his own future timber supplies, as well as the part he can play in producing wood for the Nation, and where future markets for farm woodland products will be found.

C. M. GRANGER, *Forest Service.*

FARM MECHANIZATION

MECHANIZATION SLOWS AS MORE OUTPUT AND LESS DEMAND LOWER PRICES

Implements and machinery available for use in farming have been an influence of first importance in determining the prevailing type of farming in terms of size of farm, production program, and capital requirements. But the influence that each new invention in farm machinery has had on American agriculture has been closely limited by the nature of the farm land in each part of the agricultural area. Further, machinery alone has always been inadequate to bring about a full-rounded development of the agriculture of any region. There must be an economic motive for the utilization of machines strong enough to make their manufacture and sale profitable and to encourage a period of tedious and expensive experimentation in developing the machinery. In the long run, the demand for the production which the machine facilitates, is the most essential motive in its utilization

The period since the World War has witnessed a remarkable acceleration in the readaption and use of agricultural machinery, with attendant expansion in agricultural production, both in this country and abroad. Further development in mechanization must be conditioned: (1) By the adaptability of the various portions of our agricultural area to the practical and economic use of new implements; (2) by the extent and character of the demand for the commodities whose production may be increased by the new machines; (3) by the degree of success with which these machines fit into the present organization of farms, or could be fitted into a system reorganized on the basis of the use of new machines and new practices which they induce, and the type of financial and business organization necessary to make their use both technically successful and economically feasible.

In general, the liberal use of machinery has been inseparable from a high degree of commercialization in agriculture. Frequently the invention of a single machine, which met a keenly felt need in the technical processes of production and thus removed an essential limitation to volume of output, resulted in a remarkable expansion in a given type of agriculture.

The most outstanding example in American agriculture probably was the invention of the cotton gin late in the eighteenth century. This invention, with subsequent improvements, was the prime factor in the rapid spread of cotton production. Mechanization in planting

and cultivating cotton never progressed very far until recently. For years relatively low-priced labor enabled growers to furnish a sufficient supply of cotton at relatively low production costs. Shortly after the World War exceptionally heavy boll-weevil damage in the older cotton areas resulted in relatively low production and good prices; and cotton growing in the subhumid sections of Texas and Oklahoma was greatly expanded. These areas are particularly suited to the use of machinery, and here the mechanization of cotton farms has been considerably developed.

Another important example of key inventions releasing forces that make for rapid agricultural expansion was the invention of the reaper early in the nineteenth century. The production of small grains, particularly of wheat, in the earlier times and in more primitive countries, had been characteristic of self-sufficing, small-scale farming. The daily bread of the peasant and the feed for his flocks and herds, so far as they were given rations of grain, depended on primitive hand-labor methods to so large an extent that no very large surplus was produced for market. Russia produced a surplus of grain under primitive technic but large production for export was not forthcoming until there was a considerable utilization of modern tillage and harvesting machinery. In the United States, the first implement to promote rapid development of the Middle West was the steel plow, which facilitated the plowing of heavy prairie soils. Then came the invention of the reaper, the grain separator, and hay harvesting machinery, all within the 30 years before the Civil War. The Civil War, by increasing the demand for food products and making labor scarce, gave impetus that led to a rapid expansion in the use of these machines. Great expansion in the farm area in the upper Mississippi Valley came in the decades following the Civil War, and resulted in a heavy exportable surplus of grain. About this time the binder began to replace the reaper. This period marked the rapid spread of wheat production across the upper Mississippi Valley and into the Great Plains area. It marked, also, the first development of wheat farming on a truly large scale in the Sacramento Valley, the Palouse country, and the Red River Valley. It was in the Sacramento Valley that the combine was first used, and in its early development the steam traction engine was used with it as a source of power.

These developments had a profound influence on types of farming in the various parts of the small-grain region. The mere displacement of man labor by horsepower and machinery did not greatly change the farm organization so far as the human element was concerned. It eliminated the hiring of considerable seasonal labor, but did nothing to displace the family farm. It did much, however, to change the size of the operating unit; because all these inventions increased the capacity of labor. The acreage per man was greatly increased as was also the amount of capital necessary to finance a farming enterprise.

About the opening of the twentieth century the internal combustion engine began to be used on the farm, first as a source of stationary power, then in the tractor, and finally in the truck. This development did not come rapidly at first. It was only with the coming of the World War that universal attention was turned to the importance of the tractor as a source of mechanical power, and that the development of tillage and harvesting implements and machinery to fit this new source of power was seriously considered. During and after the war

there was an important development in perfecting the tractor as a mobile power unit and in developing the combined harvester-thresher. These developments again profoundly influenced the type of farming within the small-grain areas, and significantly shifted the boundaries of the territory devoted to wheat production.

New power and new machinery have again increased the capacity of the farmer in terms of land and capital and they have vastly increased his output of wheat and other small grains. More labor has been displaced, a still larger investment must be made in farm equipment, and the acreage that one man can handle has been increased.

This period has induced a great deal of discussion of the future type of business and technical organization of the farm. A few conspicuous examples of corporations being organized for agricultural production, securing vast holdings of land, and operating on exceptionally large scale, have raised seriously the question whether, with the new type of machinery, the family farm would continue to have a place, particularly in small-grain farming; and whether the corporation, with its greater command of capital and its allegedly higher degree of technical efficiency, would not become the prevailing type of business unit. Statistics lend but little support to such a supposition. There have been comparatively few instances of the promotion and subsequent operation of corporation farms in a manner sufficiently satisfactory to draw capital from other industries. Experience thus far offers inconclusive evidence; but it seems apparent that the family farm, transformed as it has already been to a considerable extent in the amount of land and necessary capital as well as in equipment and technic, will continue to remain the dominant type of farm-business organization.

Recent developments in farm machinery in the corn and livestock regions also have been conspicuous. There has been a very extensive substitution of tractors for horses as a source of power, and significant changes have taken place and are taking place in the introduction of higher-capacity planting, tilling, and harvesting machinery for corn and for the small-grain feed crops. Dependent as is this whole region on livestock as the end product and the direct source of income, it is an open question whether the wave of mechanization can ever have so important an influence upon the type of farming as it has already had in the small-grain region. To be sure, animal-husbandry practices have lent themselves to some mechanical devices that tend to eliminate or reduce labor requirements. Milking machines and cream separators have been introduced and improvements have been made in the facilities for feeding livestock and for marketing livestock products; but as yet the effect of these things in increasing the scale of operation has been generally less striking than has been the effect of machinery on crop production.

The recent drop in the prices of farm products has caused a marked slowing up in the adoption and use of farm machinery. Further development in mechanization must rest on such an improvement in the prices of agricultural commodities as will justify the considerable capital outlay necessary. The present period seems to be a repetition of recent history. The period between 1870 and 1900, as already indicated, was one of rapid agricultural development in this country. Farm machinery was not the least among the elements that stimulated this rapid development. As is always likely in such circumstances, the

development went too far and helped to bring about a depression in agriculture.

We have usually conceived such a condition of maladjustment to be remedied by a redistribution of population and capital between agriculture and the other industries. That such a readjustment process was actually under way during the last decade is indicated by statistics on the movement of population to and from agriculture. Up to 1931, every year since 1924 witnessed a net movement out of agriculture into urban pursuits. Undoubtedly this movement was going on before 1924; but except for 1922, which showed the same movement, figures are not available. This net movement from farms averaged during the seven years, 1924–1930, about 640,500 persons annually. But, in 1930, this net movement from farms greatly declined. After allowing for deaths and births on farms, there was a net gain in farm population during 1930 for the first time in many years. This net gain amounted to 208,000 as compared with a net loss in 1929 of 269,000. Unemployment in industry is even less attractive than low returns in farming, and it seems obvious that further readjustment in our agricultural output through reduction in the number of farm families will have to await a substantial recovery in industry and trade.

This, in turn, has its inevitable effect upon the further mechanization of agriculture and the rate at which it can proceed. As long as human labor is superabundant and therefore cheap, no very rapid substitution of machinery for labor can take place. Further, the costs of employing machinery seem to have a significance different from that of costs involved in employing proprietor and family labor upon the farm. Machinery costs must, for the most part, be met with fairly immediate cash payments which must come from the gross value of the product of farm operations. On the other hand, family and farmer labor costs are not always met to their full nominal value from the product produced, and failure of the farm business to return such values does not usually result in bankruptcy nor in the immediate abandonment of the farm.

The present situation with reference to farm mechanization and its relation to types of farming may be summarized somewhat as follows: The developments in mechanical sources of power and in implements and machinery to accompany them have, during the last 15 years, greatly increased the purely physical efficiency of human labor in the production of farm commodities. As long as favorable prices for these commodities could be secured this physical efficiency was reflected in economic efficiency and higher profits, and worked to displace considerable human labor, to increase the size of the operating unit, and to expand the output. These very developments, however, have helped to reduce the prices of commodities, and thereby to reduce the economic efficiency and hence the profits of farm operation under present conditions. It would seem that eventually not merely the present technic but one characterized by a considerably higher degree of mechanization will probably prevail. This development, however, must await very thorough-going economic adjustments, not only at home but abroad, before the prices of farm products can be such as to stimulate again a rate of growth in the use of farm machinery comparable with that which prevailed in the 10 years immediately following the World War.

C. L. Holmes *and* M. R. Cooper,
Bureau of Agricultural Economics.

MECHANIZATION AFFECTS BOTH SUPPLY OF AND DEMAND FOR AGRICULTURE'S PRODUCTS

Within the last decade, the marked increase in the use of large-scale farm machinery and mechanized power has had an important influence upon the agricultural price system. The general effect of this movement toward mechanization has been to increase the production per farm laborer, to lower the price per unit of farm produce, and to transfer labor from the farm to the mine, the machine shop, the transportation system, and the sales force—a transfer that helped to cause the 11.5 per cent decrease in our farm population between 1920 and 1931.

The first important influence of mechanization has been to increase agricultural production. For example, the introduction of the combine and the increase in the use of the tractor in wheat production have resulted in a 65 to 85 per cent reduction in the amount of direct labor required per acre in wheat production on some of our level, semiarid land; in an increase in the cash expense per farm; and in an increase in the size of the farm unit that the individual wheat producer can handle.

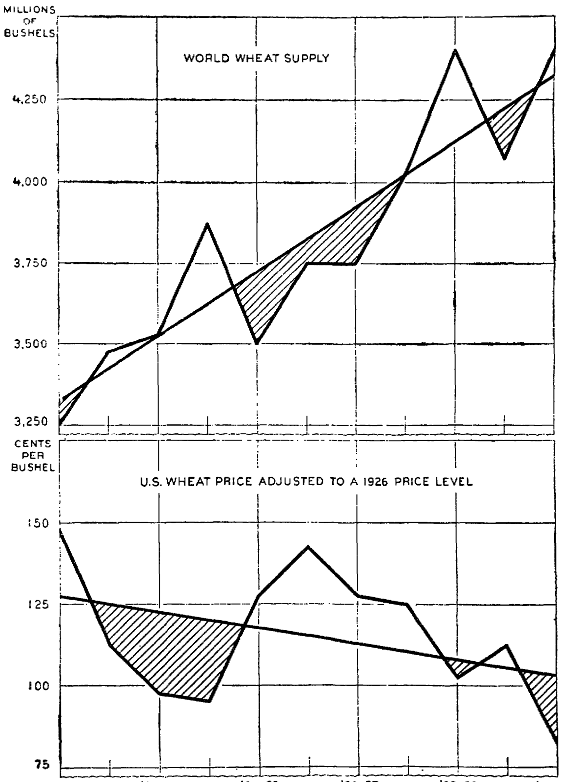

FIGURE 157.—When the world wheat supply and the average farm price of wheat in the United States from 1920–21 through 1930–31 are compared, the supply-price relationship is quite clearly indicated. When the wheat supply has been above the trend line, prices have been below average and when the supply has been below trend, prices have been above average

This, in turn, has meant some reduction in the margin between the cash expense and income per farm, provided the amount of wheat sold remained unchanged. The wheat farmer, therefore, has been inclined to increase the size of his farm in order to secure a more efficient utilization of his machine equipment and in order to increase his farm income. Large-scale wheat production by the machine method, however, has tended to be a cheaper production method than the old direct-labor method.

As a direct result, wheat production in areas suited to mechanization was quite profitable up until the 1930–31 season. Because of this, wheat acreage has tended to increase from year to year in the level, semiarid areas in the United States, Canada, Argentina, and Australia. The result, as shown in Figure 157, has been a 25 per cent increase in the

world wheat supply since 1921–22; and even though the world demand for wheat has apparently been increasing from year to year, United States wheat prices, when adjusted for changes in the general price level, still show a downward trend from 1920–21 through 1930–31.

In contrast to this first important influence of mechanization, that increases production and depresses prices, there is a second important influence that transforms the type of power used in agriculture and decreases prices by decreasing the farm demand for farm produce.

The increasing substitution of multiple-row for 1-row implements and the substitution of the tractor and the motor truck for the horse and mule have decreased the number of horses and mules required in American agriculture. This combined effect of improved machinery and mechanized power has resulted in a 29 per cent decrease in the number of horses and mules on farms in the United States between 1920 and 1931.

This decrease in the number of horses and mules in turn means an increase in the demand for raw materials and industrial labor and a decrease in the demand for pasture, hay, and grain. But just as an increased production is accompanied by a lowered price level, so is a decreased demand.

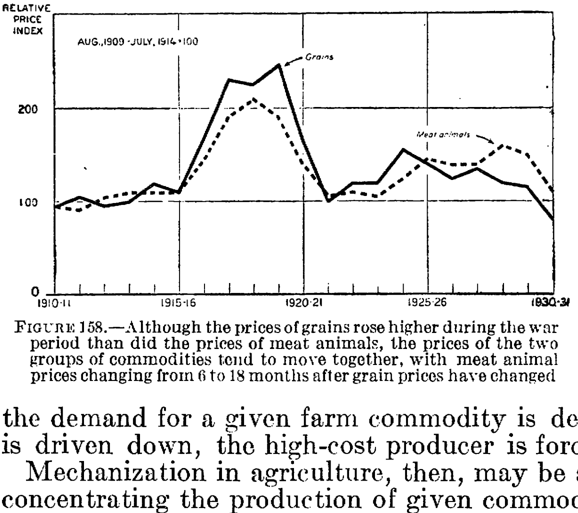

FIGURE 158.—Although the prices of grains rose higher during the war period than did the prices of meat animals, the prices of the two groups of commodities tend to move together, with meat animal prices changing from 6 to 18 months after grain prices have changed

The third important influence of mechanization is a result of the first two. When the production of certain farm products is increased and the price is driven down, the high-cost producer is inclined to readjust by cutting acreage. Again, when the demand for a given farm commodity is decreased and the price is driven down, the high-cost producer is forced to cut production.

Mechanization in agriculture, then, may be an important factor in concentrating the production of given commodities in the areas that possess the highest comparative advantage or are best suited to the crop under consideration. Since 1920, this process has been illustrated by the increasing concentration of hog production in the Corn Belt and of wheat in the Great Plains area.

In the case of the typical field crop, the effect of mechanization has tended to be direct. In the case of wheat, production costs have been decreased, production increased, prices decreased or prevented from increasing, and the acreage readjusted on the new cost basis. In the case of corn, both the production costs and the demand have been decreased and prices have been depressed. Again, in the case of horse and mule prices, the effect has been direct—demand has been decreased and prices have been depressed.

Indirect Effect on Livestock Industries

In the case of meat animals and dairy and poultry products, however, the effect of mechanization has been indirect. To begin with, the

price of the farm-raised hay and feed grains is affected by mechanization. But since the feed cost is the most important cost element in livestock production, changes in the price of farm-raised feeds, as indicated in Figure 158, soon tend to be transferred in part to livestock prices.

We may conclude that mechanization is an important influence behind the price of certain agricultural commodities, which, through the last decade, has tended to increase production enough to offset the increase that might have been expected in the agricultural price level had agricultural production remained unchanged while the population of the United States and of the world continued to increase. This influence, in turn, has been exerted: (1) By decreasing production costs and increasing production, (2) by decreasing the farm demand for certain agricultural commodities and thus increasing the net productive acreage, and (3) by concentrating the production of certain agricultural commodities in the regions best suited to their production and thus still further decreasing costs.

ORIS V. WELLS, *Bureau of Agricultural Economics.*

MECHANIZATION HAS MADE GREATEST PROGRESS IN THE GREAT PLAINS REGION

Perhaps in no other agricultural region of the United States has there been a more fertile field for the mechanization of agriculture than in the Great Plains—that vast expanse of country extending from the Panhandles of Texas and Oklahoma to North Dakota and Montana. This region, all lying within a range of 13 degrees of longitude, is characterized by wide extremes of temperature, low rainfall, high winds, a loose loam soil, and comparatively large stretches of level land; all of which have contributed to an agriculture that has grown and thriven on mechanical power.

At first the home of the Indian and the buffalo, then of the Texas steer which followed the Chisholm Trail, this region has been open to settlement for about half a century. Though it was first homesteaded in half-section units or less, the passing years have witnessed a consolidation of these small units until to-day single farms embracing thousands of acres are not uncommon. Varied as the sections from which came the settlers, were the horse-drawn implements that they brought with them to subdue the wild prairie sod. There followed years of experience, development, and trial before suitable equipment that would function most efficiently under Great Plains conditions was available.

During the agricultural infancy of this region changes in the methods and machines of production and in the strains of crops grown took place as the new settlers became accustomed to the peculiarities of their new surroundings. Horses and mules, before 1910, were about the only source of motive power available and the daily capacity of individual workers was dependent upon the size of these teams and the implements they pulled. With the available power and equipment at his command the agricultural worker in the winter-wheat belt of the Great Plains could handle without help, except during the peak-load periods of wheat seeding and harvest, an average of about 320 acres of crop land, 200 to 220 acres of which was in wheat and the

price of the farm-raised hay and feed grains is affected by mechanization. But since the feed cost is the most important cost element in livestock production, changes in the price of farm-raised feeds, as indicated in Figure 158, soon tend to be transferred in part to livestock prices.

We may conclude that mechanization is an important influence behind the price of certain agricultural commodities, which, through the last decade, has tended to increase production enough to offset the increase that might have been expected in the agricultural price level had agricultural production remained unchanged while the population of the United States and of the world continued to increase.

This influence, in turn, has been exerted: (1) By decreasing production costs and increasing production, (2) by decreasing the farm demand for certain agricultural commodities and thus increasing the net productive acreage, and (3) by concentrating the production of certain agricultural commodities in the regions best suited to their production and thus still further decreasing costs.

ORIS V. WELLS, *Bureau of Agricultural Economics.*

MECHANIZATION HAS MADE GREATEST PROGRESS IN THE GREAT PLAINS REGION

Perhaps in no other agricultural region of the United States has there been a more fertile field for the mechanization of agriculture than in the Great Plains—that vast expanse of country extending from the Panhandles of Texas and Oklahoma to North Dakota and Montana. This region, all lying within a range of 13 degrees of longitude, is characterized by wide extremes of temperature, low rainfall, high winds, a loose loam soil, and comparatively large stretches of level land; all of which have contributed to an agriculture that has grown and thriven on mechanical power.

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balance in feed crops. In the spring-wheat belt the same total acreage could be handled with 160 acres in wheat, 40 in summer fallow, and the balance in feed crops.

Horses and Mules Largely Supplanted

Rapid changes in farm power began taking place after 1910 and were augmented by the stimulus to agriculture resulting from the World War. Horses and mules were supplemented by mechanical power in the form of tractors, trucks, and automobiles. Tractor figures by States are not available for the early years. As a source of farm power, however, the tractors were relatively unimportant in 1909, the first year in which figures on the number manufactured were available. In that year 2,000 were manufactured in the United States. In 1919 the United States census reported a total of about 82,000 tractors on farms in the eight important wheat-growing States of the Great Plains. Of these States, Kansas led with a total of 17,000 machines. Colorado, with about 5,000, had the fewest. Tractors of this decade were mostly of the large, slow-moving type, crude in construction and costly in operation. Trucks and automobiles were of little importance as a means of transportation in 1909, when about 3,000 of the former and 122,000 of the latter were manufactured. By 1919, there were about 27,000 trucks and over 500,000 automobiles on Great Plains farms. That these machines were exerting an influence on power usage is indicated by the fact that during this period, while the total number of horses and mules increased nearly 8 per cent on the farms of this region and this increase was accompanied by a 51 per cent increase in wheat acreage, there was a decrease in number per 100 crop acres of from 6.2 to 5.3 head. It was about the end of this decade that small tractors pulling 2 and 3 bottom plows were introduced, and that they were immediately popular is partly evidenced by the fact that the number of tractors manufactured in 1917 and 1918 was about 100 per cent greater than in each preceding year.

During the next 10-year period rapid mechanization took place and the number of tractors on Great Plains farms increased from about 82,000 in 1919 to 274,000 in 1929, trucks from about 27,000 to 100,000, and automobiles from about 500,000 to 1,000,000. Kansas, which led in number of tractors in 1919, was still leading in 1929 with a total of 66,000, an increase of nearly 300 per cent; whereas Colorado, still following the other States, showed about 200 per cent increase. Wheat acreages, as in the past decade, again increased and in 1929 were 15 per cent higher than in 1919. Horses and mules, however, showed a decline of approximately 13 per cent in total numbers and from 5.3 to 3.6 head per 100 crop acres.

The increasing and widespread use of tractors and the power equipment necessary for their most efficient operation, together with trucks, has been reflected by radically changing machinery values per crop acre. For the year 1909 machinery values per crop acre for the Great Plains averaged only $3. This value represents equipment practically all of which was horse drawn. By 1919, not only because of more machinery but because of a high general price level, values had risen to $7, an increase of 133 per cent, on a crop acreage 26 per cent greater than that of 1909. Because of more efficient tractors and larger equipment as well as some decline in prices, 1929 values per crop acre on an

acreage 30 per cent greater averaged $1 lower than those of 10 years previous.

The Combined Harvester-Thresher

Expanding wheat acreages, increases in machinery values, and declines in numbers of work stock, although caused primarily by mechanical power, have been influenced to a very marked degree by power equipment. Perhaps the chief influencing factor of equipment is the combined harvester-thresher. This machine, first used in the wheat-growing districts of the Pacific coast many years ago, is comparatively a newcomer in the Great Plains. Some 20 years ago a few machines were brought into the Judith Basin of Montana where they proved successful. One or two were carried as far south as Nebraska, but their usefulness there was short-lived. The first small combine was manufactured early in the present century, and its use and life in the Intermountain and Pacific Northwest States were also rather short. The first small prairie-type combine, 10 to 20 feet in size with a capacity of about 30 to 50 acres per day and equipped with an auxiliary motor, was introduced into the Great Plains in 1918. This machine in the years that followed proved to be practical, efficient, and economical under most conditions in that region. From a few machines in 1918, Kansas in 1926 had an estimated total of about 8,300 combines which cut 30 per cent of the wheat crop that year. It was estimated there were about 20,000 combines on Kansas farms for the harvest of 1931. Other Great Plains States have no doubt shown proportionate increases in numbers of combines on wheat farms in view of the fact that in the period 1927 to 1930, nearly 66,000 combines were sold in the United States.

In the winter-wheat area, the disk harrow-plow with a daily capacity of 25 to 30 acres, is replacing other implements in preparing the land for planting. In the spring-wheat area where summer fallowing is necessary, the duck-foot cultivator has partly eliminated plowing. Mechanical power in conjunction with these and other machines has so lowered production requirements that former submarginal lands once considered good only for grazing are now producing wheat that, under normal-prices, returns a profit on labor and materials of production.

An examination of the effects of mechanization on labor requirements shows clearly why the trend has been toward modern units of power and equipment. Investigations made in Montana, for example, indicate that where 35,000 wheat farmers were operating in 1915 to 1917, there were only 14,000 in 1929 and they in turn were handling a larger acreage. Man-labor requirements that, under the old system, amounted to from 10 to 14 hours per acre have been reduced to from 2 to 3 man-hours per acre under present conditions. Records from individual farms show that with horses it is possible for one man with some help at harvest time to handle 320 acres of crop land. With the old heavy-type tractor 700 acres per man could be handled; substituting a lighter modern 3-plow machine, 1,000 acres; and with a modern heavy-duty tractor of 30 draw-bar horsepower, 1,600 acres. Investigations made on a number of farms in Kansas show an average man-labor requirement of 6.6 hours, for producing an acre of winter wheat entirely with horses under the old methods, whereas on farms operated entirely with mechanical power and using a 20-foot combine, only 1.34 man-hours are necessary

Production Methods Immensely Changed

It is clearly evident that mechanical power and equipment are forces that in the operator's hands have allowed him completely to change his methods and practices of production. In the rapidly moving picture of agricultural changes and adjustments, the effect of mechanization on the society of the community perhaps has been obscured by the stupendousness of machine production and the wonder with which it is viewed. By enabling one man to handle an acreage several times that formerly handled with horses, mechanization has led to the consolidation of farms and to a reduction in farm population as evidenced by the changes in the numbers of wheat farmers in Montana where there has been a decline of 60 per cent together with a slight increase in total crop acreage handled by those remaining, who procured the additional land through purchase from less aggressive neighbors, and by purchase or lease of abandoned or State land.

In many communities mechanization has led to what may be termed a semiabsentee-operator system of wheat farming. Under this system the operator is on the farm or in the community only long enough to put in and harvest the crop. It is the present custom of many farmers immediately after harvest to move with their families to large towns where school and social advantages are on a higher plane than in their own community or neighboring towns. Others spend the winter in the warm climates of Florida or California. It is not infrequent to find farms to which the operator comes only in the spring and fall, leaving his family in some distant town or city. Under such a system, together with a decreased farm population, many of the small prairie towns dependent on farm trade for their existence can not survive. It may be argued that they are not a necessary adjunct, for with the automobile or truck the distant large town is quickly available for immediate wants. The majority of large towns in agricultural sections, however, are just as dependent on farm trade, and they too must shrink to a size that can be maintained by a smaller rural population, part of which supports the community for only a fraction of the year.

L. A. Reynoldson, *Bureau of Agricultural Economics.*

CORN BELT INCREASING ITS OUTPUT PER MAN IN ALL PHASES OF CROP GROWING

The Corn Belt of the United States includes territory naturally well suited to the development of farm mechanization. This is due to the fortunate combination of gentle topography, fertile soils, and a climate favorable to a number of crops. Moreover, in this region a large proportion of the farms are over 100 acres in size. However, in so far as sections of the Corn Belt are dependent upon livestock as their end product and the direct source of income, they will never be open to mechanization to quite the same extent as are regions given over to small-grain production alone.

Increase of Accomplishment per Man

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Increase of Accomplishment per Man

According to studies of farm organization in the Corn Belt, the recent addition of mechanical power has raised the accomplishment per man

per day in the case of every operation studied. Thus, plowing with five horses 4.5 acres per day compares with 7 acres plowed with a 2-plow tractor and 11 acres plowed with a 3-plow unit.

Similarly, the accomplishment per man in double disking is raised from 14.5 to 21.5 and 30 acres, respectively, while plank dragging with five horses covering 20 acres per day becomes 37.5 acres when done with the tractor. In like fashion, cultipacker, harrow, and rotary hoe, each drawn by four horses and covering 16.5, 24, and 22 acres, respectively, cover 23, 43, and 31 acres when tractor drawn.

Planting corn, until recently a task delegated to the fast-walking team of the farm and averaging in the above mentioned studies but 14 acres per day, was, through the use of the 4-row power planter, speeded up to 33 acres. In the cultivation of corn the use of cultivators of the 4-row type, usually tractor operated, has raised the accomplishment per man to 40 acres per day from the former 6 to 8 acres for single row and 12 to 14 acres per day for 2-row, animal-drawn implements.

Another important stride in the mechanization of corn growing is the perfecting of the mechanical corn picker. Where two hand huskers under farm conditions were reported as husking 2.8 acres per day, two men and a 1-row picker husked 6.7 acres whereas two men and a 2-row machine harvested 10 acres. In corn yielding 50 bushels per acre, this represented 70, 167.5, and 250 bushels per man per day, respectively.

The entire operation of growing corn, often consuming 15 hours of man labor per acre under the older methods, has been performed on many farms with but 7 to 8 hours of man labor when these advanced stages of mechanization are introduced. Individual instances show even more striking differences.

Small Grains in the Corn Belt

In like manner these recent changes in mechanization have been adopted on Corn Belt farms in the operations incident to the culture of small grains and forages. This is strikingly seen in the seeding of oats and wheat in which, depending upon the particular combination of operations employed upon different farms, from 37 to 74 per cent of the power application was supplied by the tractor. On the same farms approximately 60 per cent of the work on soybeans was done by tractor power. In harvesting and threshing oats a crew of 17 men using stationary grain separators for threshing, applied 5.6 man-hours per acre whereas with a combined harvester-thresher a crew of 3 men used but 1.3 hours. For wheat the figures were 16 men and 6.1 hours per acre compared to 3 men and 1.3 hours, respectively.

An item worthy of note in this connection is the increase in crop acres per worker between 1909 and 1929. Based upon figures taken from the Federal census the Corn Belt States reported increases in crop acres per worker of from 15 to 37 per cent; although obviously this increase is not to be credited entirely to mechanization.

Horse and mule numbers on farms in the United States declined from 21,217,000 in 1910 to 17,611,000 in 1930, a decline of 17 per cent. For the Corn Belt States these numbers have likewise decreased, the decline from 1910 to 1930 being 22.5 per cent in Iowa and 36 per cent in Illinois. This decline is in part due to the introduction of the automobile, the truck, and the tractor, but is also due in part to other changes in farm technic aside from the introduction of mechanical

power. More significant perhaps is the accompanying decrease in the number of horses used per 100 acres of crops. In every State of the Corn Belt this figure has declined, the figure of 6.5 horses per 100 acres of crops in Iowa in 1910 becoming 4.6 in 1930, whereas for Illinois the figures are 6.8 and 4.2 respectively. Michigan with less opportunity for mechanization shows a decline from 6.6 to 4.1 and Missouri from 8.1 to 5.3.

Change in Size of Farms

Increasing mechanization on individual farms, by reducing the demand for man labor upon a given acreage, may result in hiring less outside labor. Given a fixed labor force, or one that is reduced with difficulty, the result may be the combination of several farms into one. Usually, however, mechanization results in the addition of odd tracts of land to the area already included in the operation of the farm.

Studies in specific regions show that a few farms have been combined and some farms have been enlarged probably as a result of the greater accomplishment per man growing out of increased mechanization. Despite this evidence, however, the trend to combine or enlarge farms is but dimly discernible in the published census figures for the United States. This is in part due to the increase in the number of small farms near cities, offsetting the increase in the size of the larger farms. Individual States in the Corn Belt show this tendency toward larger-sized units with somewhat greater definiteness. When counties in the major corn-growing regions are studied in detail a tendency toward increase in the size of farms over 100 acres appears. This tendency is as yet insufficiently marked to be considered a definite trend.

Farms under 100 acres show but slight opportunity to adopt the more complete phases of mechanization. At present farms under 100 acres represent from 28 per cent of the total number of farms in Iowa to 60 per cent of the total number of farms in Michigan; this variation depending upon local conditions. Whether these small farms will be eliminated in the future is a matter of conjecture. Some of them probably will always have a place because of peculiar conditions of the local market and the nature of the land, or the particular tenure conditions prevailing.

Extent of Mechanization

Satisfactory data are lacking to depict for local regions the extent to which the more recently developed forms of mechanization have been adopted by American farmers. For the United States as a whole a large relative increase in tractors has taken place. As noted in a previous article, in 1909, 2,000 tractors were manufactured in the United States. For 1930, the Federal census reports 920,000 tractors on farms. Illinois alone reports almost 70,000, Iowa 66,000, Ohio 53,000, and other States smaller but still significant numbers. Similarly, tractor-drawn cultivators of which 1,698 were sold in the United States in 1925 increased to 41,577 in 1930, whereas mechanical corn pickers, of which 7,145 were sold in 1927, were reported as being sold to the number of 9,871 in 1930. The combined harvester-threshers, a number of which are being used in the grainfields of the Corn Belt, have increased from 1,590 sold in the United States in 1924 to 17,031 sold in 1930.

Despite these large relative increases in numbers there is but one tractor to each seven farms in the United States. In the Corn Belt States the numbers are larger, being one tractor to three farms in the States of maximum corn production such as Iowa and Illinois, but decreasing to one tractor to four farms in Indiana and Ohio, and to but one tractor to five farms in Michigan and one tractor to 10 farms in Missouri. Upon the number of tractor-cultivators sold in the United States from 1925 through 1930 it is estimated that an average of probably only one tractor-cultivator to 10 farms over 100 acres in size is to be found in the Corn Belt. On a similar basis there is estimated to be one corn picker to every 10 farms over 100 acres in size.

That the advanced stages of mechanization are less applicable to small farms is demonstrated by studies of the organization of farms in a good corn-growing section of the Corn Belt. Here, farmers with less than 35 acres of corn performed with the tractor only 11 per cent of the work; those growing from 35 to 70 acres of corn used the tractor up to 35 per cent; and those growing over 70 acres of corn used the tractor up to 45 per cent. In this same section in 1929, on 116 farms, 75 per cent of the corn was husked from the standing stalks and of this amount 70 per cent was husked by hand, 27 per cent by 1-row pickers, and but 3 per cent by 2-row machines. These proportions have changed somewhat in favor of machine huskers in 1930 and 1931 and may be low for other portions of the Corn Belt, but are still effective evidence of the limited acceptance of the advanced stages of mechanization.

WALTER J. ROTH, *Bureau of Agricultural Economics.*

MECHANIZATION IN DAIRY REGIONS INCREASING FAST, INVESTMENT DATA SHOW

The dairy region has a comparatively short growing season and lacks the large level fields that characterize the corn and wheat regions of the United States. Hence machinery and mechanical power for field work are not used here to the extent that they are used in the other regions. On the other hand, milk is a bulky product, and on a large proportion of the farms it must be hauled daily. This has led to a greater use of trucks than of tractors on dairy farms. Thus the State of New York, according to the 1930 census, had 37 trucks and 25 tractors per 100 farms, whereas Illinois had 19 trucks and 32 tractors per 100 farms.

The work of caring for the dairy herd requires more than 50 per cent of the total farm labor on the specialized dairy farms in the northeastern United States. Approximately one-half of the work on the dairy herd is taken up in milking where hand milking is practiced. This one operation under hand milking usually limits to 10 or 12 the number of cows that can be kept per worker. Few dairy farms reach the upper limit in numbers of cows to be milked per person with a milking machine. Cases of one man milking 30 cows or two men milking 60 cows are not unusual.

The number of milking machines on farms is not recorded in the census of agriculture but an indication of their numbers on dairy farms can be obtained from various farms surveys that have been made.

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In the spring of 1930 the New Hampshire College of Agriculture made a survey of 414 farms in Grafton County. Ninety-six of these farms had milking machines. A year later a survey made in Coos County showed that 42 dairy farms out of 83 had milking machines. In Connecticut the extension service obtained reports from 863 dairy farms of which 298 had milking machines. A survey of 318 farms in northeastern New Jersey in the winter of 1930–31 showed milking machines on 75. In southeastern Pennsylvania (Chester County) a survey of 204 farms in the summer of 1931 showed 21 owning milking machines.

The total investment in farm machinery per farm in the New England States increased 173 per cent from 1910 to 1930. In Wisconsin the increase amounted to 213 per cent per farm for the same period. Part of this increase was due to a rise of about 50 per cent in the price level. Mainly, however, the increase was due to the addition of trucks, tractors, automobiles, and milking machines on many farms, and to a less extent to the addition of new field machinery such as side-delivery rakes, hay loaders, corn binders, etc.

Changes Partly Attributable to Mechanization

The changes that have taken place in the dairy region during the last 20 years have been due in part to mechanization. The available measures of changes in size, efficiency, and productiveness do not measure the effect of any one factor alone, but rather are the result of a number of factors. Thus the number of dairy cows per farm in the New England States in 1930 was 26 per cent above the number per farm in 1910, and the milk production per farm for 1929 was 57 per cent above the production in 1909. It seems reasonable to assume that a part of the increase in numbers of cows during this period was due to better barn equipment and to milking machines. But the increase in milk production per farm over and above that due to the increase in numbers of cows was more likely due to better cows, and to better feeding and care of them.

Definite information on the saving of labor per cow associated with the use of milking machines was obtained in the Grafton County, N. H., survey in 1930 previously referred to. During the year the 96 farms with milking machines spent 130 hours of man labor per cow or three-fourths as much time as was spent per cow on the 230 farms that did not have milking machines. The former group had 22.8 cows per farm compared with 14.8 in the latter group.

Similar results were obtained in a survey made in the summer of 1931 covering parts of the New England States and Wisconsin. The 26 farms with milking machines used 71 per cent as much man labor per cow as did the 41 farms that did not use milking machines. The average number of cows per herd were 26 and 17.7, respectively.

This difference in size of herds would account for some of the difference in the labor required per cow. On the other hand many of the farms using milking machines have not yet adjusted the size of their herds and other factors to the new equipment so as to attain the same relative efficiency that is attained on the farms where milking is still done by hand.

Another measure that gives some indication of the effect of mechanization is the number of crop acres per farm worker. From 1909 to

1929 the number of crop acres per farm worker increased in nearly all of the dairy States. In Vermont the increase was from 26 crop acres per worker in 1909 to 30 crop acres per worker in 1929. For New York the comparable figures were 25 and 31, and for Wisconsin 31 and 36.

Labor Efficiency Study in Connecticut

A study of labor efficiency in Connecticut reported in Connecticut Agriculture Experiment Station Bulletin 172, corroborates the assumption that some of these increases were due to mechanization. Detailed records of the man labor used in haying on 115 farms showed that the 17 farms using hay loaders spent 0.65 hour less man labor per ton of hay than the farms that had no hay loaders.

A test was made of silo filling on 3 farms on which corn binders, low racks, a medium-sized cutter, plenty of power, and a well-organized crew were used in comparison with the average of 40 farms that lacked some of these essentials. These 3 farms filled their silos with 40 per cent of the man labor per ton that was used on the average of the 40 farms. Approximately the same results are reported in an earlier study in New Hampshire.

As yet mechanical refrigerators for cooling milk are seldom found on the farms, but cleaner milking, the use of more sanitary barn equipment, more ice in cooling, covered cans, tank trucks or tank cars for hauling, good roads, pasteurization and cooling at the city plants, and prompt delivery to the consumers have brought about a steady improvement in the quality of milk. Consumers have increased the quantities used per person even when the price as compared with that of other foods was increasing. Similar improvements have been made in methods and equipment for producing, handling, and transporting other dairy products. Thus we see that from the production of feed on the farm to the delivery of dairy products to the consumer, mechanization has become increasingly important.

Within the general dairy region are small areas that specialize in the production of potatoes, truck crops, and fruits. On some of the potato farms mechanization has gone practically as far as on the specialized wheat farms in the West. In Middlesex and Monmouth Counties, N. J., more than 30 potato farms, within the last two years, have done practically all of their field work with general-purpose tractors, and their hauling with trucks. Vegetables and fruits are still harvested mostly by hand but tillage operations are being performed more and more by large tractor-drawn implements. A study is now being conducted in the potato and truck areas of New Jersey to determine the conditions under which increased mechanization is profitable.

In the preparation of fruits and vegetables for the market, various homemade devices are used on the small and medium sized farms to lessen hand labor. Studies in Massachusetts of the time required in preparing vegetables for market indicate that some of these homemade devices are highly efficient. Large farms and cooperative packing plants use more elaborate and more standardized equipment.

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MACHINERY IS THE BEST MEANS YET FOUND FOR CONTROLLING CORN BORER

At the present time, control of the European corn borer is best accomplished through the use of machinery; however, because of certain habits of the borer it can not as yet be successfully combated in the growing crop, but must be attacked during or after harvest. For the application of mechanical control two general field conditions have to be met: (1) Disposal in the field of the standing stalks from which the corn has been hand or machine picked, and (2) removal of the whole stalks, with the contained borers, from the field for later disposal—as in silage or by mechanical husking and shredding.

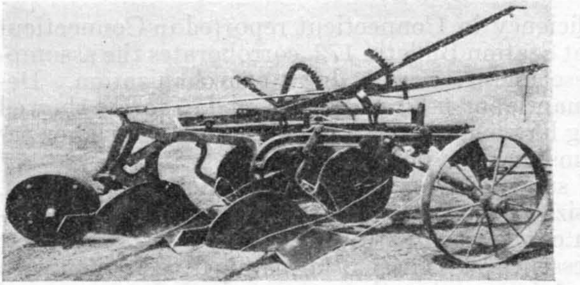

FIGURE 159.—Two-bottom plow with attachments for clean plowing—large rolling colters, jointers, and trash wires

On probably 80 per cent of the corn acreage in the Corn Belt States the corn is picked from the standing stalks. Of this area approximately one-half is plowed and the balance ordinarily is disked down and then seeded to small grain, or it is poled, raked, and burned preparatory to being seeded to small grain.

To effectively control the corn borer the plowing must be done in such a way that all stalks and crop refuse are completely covered to a depth of 6 to 8 inches so that subsequent seeding and tillage operations or weathering will cause little, if any, of the buried trash to reappear. Because of this elimination of their shelter, the borers coming to the surface die from exposure or from attacks of natural enemies.

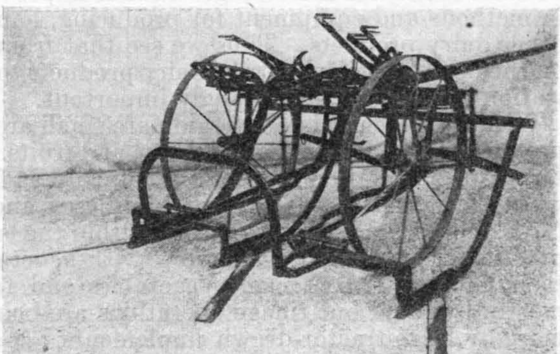

FIGURE 160.—Stalk-shaving attachment on single-row cultivator, adapted for cutting three rows at one time

Adjustment for Clean Plowing

To plow clean the implement must be properly hitched and adjusted so that it runs level, making furrows of uniform depths and widths. By the use of special attachments such as trash wires, large colters and jointers, clean coverage is greatly facilitated. Figure 159 shows a plow fitted with special attachments. Fourteen-inch plows give fair

coverage, but 16 and 18 inch, in most cases, give better coverage. It has been found that careless adjustment has a greater relative effect on the performance of a small plow than on that of a large plow.

Where the stalk fields are to be seeded to small grain the treatment of the crop débris for borer destruction is important. Disking only, before seeding, results in killing only a negligible percentage of the borers. By the ordinary processes of poling, raking, and burning, not enough borers are destroyed to effectively control the pest. Field tests have indicated that for satisfactory poling a temperature below 20° F., high moisture content of stalk, and freedom from snow are essential. Observations at Toledo, Ohio, extending over four years, showed these conditions existed on only one or two days each winter. Even under the best conditions all stalks were not severed and clean

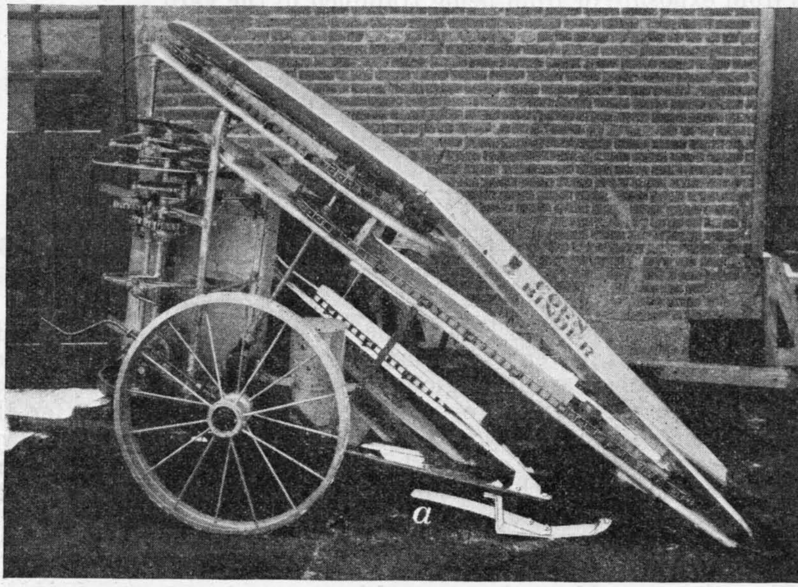

FIGURE 161.—Low-cutting attachment on corn binder. With the curved stationary knife (*a*) for cutting the stalks at ground surface, it is necessary to use also a sickle guard and special springs and guides to hold the stalks

raking was difficult if not impossible. Moreover, the stalks were considerably shattered and the borers thereby scattered about.

By the use of a 2-row sled stalk shaver or a single-row cultivator with a 3-row stalk shaving attachment (fig 160), practically all stalks may be detached flush with the ground surface. With two sled shavers abreast, four rows may be cut at one time. The attachment for cutting three rows has been adapted to six of the commonly used single-row cultivators. For cutting four rows, a 4-row attachment has been made for two common makes of 2-row cultivators. Attachments for 3 and 4 row cultivators are in process of development.

Clean Raking Necessary

After the stalks are detached, clean raking in piles or windrows is necessary. This is best accomplished by the special 4-bar side rake, although the dump rake followed by the ordinary hay side rake will

do a fairly satisfactory job. Burning then follows, during which operation care should be taken that all stalks and bits of débris are consumed by the flames.

In harvesting, if the stalks are cut flush with the ground surface, most of the borers may be removed from the field in the stalks. The ordinary corn binder leaves stubble at least 5 inches long. By the use of a binder equipped with the stationary-knife, low-cutting attachment, the stalks may be cut at the ground surface. (Fig. 161.) For surface cutting by hand a special corn-harvesting hoe may be used.

After the corn is removed from the field, careful ensiling results in practically complete borer destruction, as does also mechanical husking and shredding. Borers which escape the knives of the silage cutter perish in the silo. Those that are not killed in the husker-shredder die from exposure or from being trampled in the yard.

The foregoing applies particularly to the 1-generation area, or north-central infestation. With some modifications, chiefly as to plowing and the low-cutting of the corn, the measures are applicable to the 2-generation or New England infestation.

R. B. GRAY, *Bureau of Agricultural Engineering.*

MECHANIZATION IN SOUTH HAS BEEN RETARDED BY LACK OF A COTTON-PICKING MACHINE

Below the Mason and Dixon line, in the old Cotton Belt, the use of mechanical power and equipment has lagged, when compared with its use in other farming regions. This is not because the southern planter is more conservative, more satisfied to carry on after the fashion of his fathers, less progressive than his neighbor in the newer cotton regions of Texas and Oklahoma, or less eager for efficient methods of production, than are farmers in the Wheat and Corn Belts; but because of peculiar circumstances that have, at any rate until now, generally counterbalanced much of the effectiveness of the larger units of machinery.

Where farm machinery has proved its economic value in the South it has been adopted rapidly and generally. Thus in the Cotton Belt of western Texas and Oklahoma, where itinerant labor is available for chopping and picking, and where the size of farm and the topography are generally well suited to the use of large machines, mechanization to a considerable degree has been adopted for handling cotton, grain sorghums, truck, and small grains, which are the principal crops grown. A survey of the rice area of Arkansas shows that there is not a single rice farm without tractor power. Even the most highly mechanized sections of the Wheat Belt are not generally so completely stocked with machine power.

In contrast to the general use of power machinery by rice growers, the cane growers of Louisiana have been cautious about replacing their mules with tractors. Of 74 cane farms studied in 1929 only 8 were using tractor power. Others contemplated the use of tractors for the 1930 season. The cotton farmers in the hill sections of the South make a still smaller use of mechanical power and even in the Delta sections the mule remains the prime source of power.

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Factors Resistant to Mechanization

A number of factors contribute to this resistance to mechanization in much of the "Old South." The cropper system of tenure is based upon small farming units, and can operate only with them. So long as cotton is chopped and picked by hand, there is no advantage in conserving labor for other operations since the workers must be retained throughout the year so that they will be on hand for these very important and seasonal duties. To this difficulty is added the handicap in the shortage of available labor now trained in the use of mechanical devices. Over a great part of the Old South the farms are too small to warrant a heavy investment in mechanical equipment. Especially on the hill farms the fields are small and irregular in shape with a soil and topography that make terracing necessary to prevent erosion. In the wooded sections stumps in the fields often hinder the use of any except small mule-drawn implements.

Cotton, corn, rice, sugarcane, peaches, tobacco, and grain in various combinations make up a diversity of crops in the Southern States. Although tractors were in general use throughout other agricultural regions in this type of production, their adoption in the South was slow and it was not until a general-purpose tractor with specialized equipment was available that any real progress in mechanization in fruit and truck culture did take place.

Under conditions that have long existed, with mules as the only available source of motive power, the hill-section operator and his family can handle 25 to 40 acres of crops, and the plantation-cropper family about 15 acres of cotton plus a few acres of feed crops, whereas the west Texas operator alone, with larger equipment, takes care of 100 acres of crops, except during harvest. Although figures by States are not available, it is hardly probable that mechanical power in the form of tractors, trucks, and automobiles was an important factor in most of the South before the World War, or until the small tractor, pulling 2 and 3 bottom plows, was introduced about 1918. In 1919, the first year in which tractors were reported by the United States census, there were about 29,000 tractors on farms in the 10 cotton States as compared with more then 246,000 on all farms in the country. Of the total number in the Cotton Belt, about 9,000, or 31 per cent, were in Texas. Many of these were on farms that produced small grains, primarily wheat. During this same year, Mississippi could muster a total of only about 600; whereas the Corn Belt State of Illinois had 23,000 tractors on farms and the wheat State of Kansas had 17,000.

Trucks and Autos in South

As the acreage of cotton that can be handled by one man is limited by the amount that he can chop and pick, the tractor of that period did not materially affect the cotton acreage handled per man. But, acreages of other crops handled per worker no doubt showed a slight increase. Trucks and automobiles were also of relatively little importance at that time and by 1919 there were in 10 Southern States only about 21,000 of the former and 367,000 of the latter, with Texas again leading in both, and Louisiana having the fewest. During the decade from 1909 to 1919 there was an increase of over 9 per cent in the total number of mules in the 10 States. There was, however, a 19 per cent

increase in crop acreage, which resulted in a decrease in mules per 100 crop acres from 6.8 to 6.3 head, indicating that mechanical motive power was beginning to exert some influence on southern agriculture.

From 1919 relatively rapid strides were made in mechanization in the cotton States as a whole, and by 1924 the number of tractors had increased from about 29,000 to 59,000; trucks from about 21,000 to 57,000; and automobiles from about 367,000 to 664,000. During the 5-year period, 1924 to 1929, tractors again increased markedly. This increase was due to several causes, chief of which was the introduction of the general-purpose tractor, together with planting and cultivating equipment. In 1929, according to the United States census, there were about 112,000 tractors, an increase of about 290 per cent in 10 years; trucks numbered 177,000, an increase of about 740 per cent; and automobiles 1,068,000, an increase of 190 per cent. In number of tractors, Texas again led. Mississippi, however, led on a percentage basis with an increase of about 730 per cent, whereas Louisiana had the lowest percentage increase. By 1929, Texas also led in total numbers of trucks and automobiles, with South Carolina having the fewest trucks and Louisiana the smallest number of automobiles. Mississippi showed the greatest percentage gain in trucks and automobiles from 1919 to 1929, with an increase of about 1,540 per cent for the former and 440 per cent for the latter. As in the preceding decade, crop acreage in the 10 States increased, and in 1929 was about 15 per cent higher than in 1919. Mules during the same period showed a decline of nearly 8 per cent in total numbers, or from 6.3 to 5.1 head per 100 crop acres.

Multiple-Row Planters and Cultivators

In the early period of tractor usage, plows, listers, and disk harrows were about the only implements used for drawbar operations. With the development of the general-purpose tractor came the 2-row lister, and 2-row and 4-row planters and cultivators. The combine harvester-thresher, which has revolutionized harvesting and threshing operations in the Great Plains, has also invaded the Cotton Belt States. Figures showing the numbers of combines by States are not available, but it is known that as early as 1925 one combine was purchased and used in Mississippi. A study made in South Carolina in 1931 included 36 grain combines, 20 of which were bought that year. Georgia also has a considerable number, and one plantation in North Carolina had 5 combines in 1928.

With the increasing use of tractors, power equipment, trucks, and other machines, values of machinery per crop acre have changed materially. For the years 1899 and 1909, when all equipment was mule drawn, values amounted to only $2 and $3 per crop acre, respectively. By 1919, due not only to more machinery but to a high general price level, values had risen to $6, an increase of 100 per cent over 1909, on a crop acreage 19 per cent greater. With more efficient tractors and equipment, with some decline in prices, and with an acreage 15 per cent greater than in 1919, values per crop acre in 1929 averaged $1 lower than those of 1919.

While mechanical power in the South has been affecting numbers of mules, total acres in crops, and machinery values per acre, there has also been a noticeable effect on the capacity of individual workers. Comparisons between 1909 and 1929 show that in North Carolina the

acreage handled per worker increased from 13 to 16 acres; in South Carolina from 16 to 20; in Georgia, from 19 to 25; in Alabama, from 17 to 21; in Tennessee, from 16 to 22; in Mississippi, from 14 to 18; in Louisiana, from 15 to 19; and in Arkansas, from 16 to 23. In Oklahoma and Texas, where wheat as well as cotton is an important crop, acreage increases per worker between 1909 and 1929 were from 38 to 59 for the former State and from 25 to 46 for the latter. For the entire Cotton Belt the average crop acreage per worker increased from 19 to 28 acres, or 47 per cent.

In the Mississippi Delta cotton produced with mules required an average of 128 hours of man labor and 39.3 hours of mule work per acre, while that produced with tractors and some mule work required 90.8 hours of man labor, 5.5 hours of tractor and 5.3 hours of mule work.

Mechanization Prospects in Cotton Belt

What is in store in the way of more efficient and widespread utilization of mechanical power in the Cotton Belt? Eli Whitney's invention of the cotton gin was to the cotton planter what the invention of the threshing machine was to the grain grower; but the grain binder or combine harvester-thresher has no counterpart in cotton-harvesting machines and this one fact alone affects the entire future structure of mechanization for the production of cotton. As previously stated, the acreage of cotton that one man can handle is usually limited to the amount that he can chop and pick. By using a hill-drop planter, hand chopping and hoeing can be largely eliminated, but the picking is still to be done by hand; so the situation in much of the cotton country remains static. Without a successful cotton-picking machine, the planters in many sections are faced with the necessity of maintaining throughout the year a labor force sufficient to pick the crop, and extensive mechanization would result in piling up many idle hours for the croppers waiting for harvest time. The sugarcane planter finds himself in much the same position as the cotton grower. Planting and harvesting are still done by hand because of a lack of suitable equipment.

At present there are a number of cotton-picking machines which, according to unbiased observers, are nearing the stage of development bordering on success. In the last few years there have been developed machines for planting and harvesting cane which, according to reports, have possibilities of success. The next few years should witness the success or failure of the cotton and cane machines; and if they are successful there may be in many sections a concerted rush toward mechanization just as pronounced as that which has occurred on the wheat farms of the Great Plains.

L. A. Reynoldson *and* B. H. Thibodeaux,
Bureau of Agricultural Economics.

COTTON QUALITY AFFECTED IN GINNING PROCESS BY MOISTURE IN SEED COTTON

Each season the problems encountered by growers and ginners in handling and ginning cotton seem to increase. There appears to be no single factor, however, so important to the ginning of cotton and to its resultant quality as the moisture content of the raw seed

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cotton. It is commonly known, for instance, that where cotton of inferior preparation occurs it frequently is due to the ginning of seed cotton that has not been properly conditioned; that is, material which is early or so-called green-sappy, on the one hand, or late, dew-laden, or rain soaked, on the other.

When the cotton crop receives excessive rain during the growing season, heavy foliage and rank stalks prevent the maturing bolls from being sufficiently exposed to sunlight. Consequently, the bolls open more slowly, and the seed cotton possesses a high percentage of moisture, making it very heavy. It has been the general practice for growers to harvest and gin such seed cottons in this condition. In recent years, however, with prices declining, the growers have realized more than ever the need for rapid and adequate conditioning of their seed cotton before it is ginned. Some growers have renewed the old custom of sun drying and of storing their cotton in small cotton houses or cabin galleries for several days before ginning. Such practices, although possessing merit, are sometimes rather costly and cumbersome, and are hampered by unfavorable weather conditions.

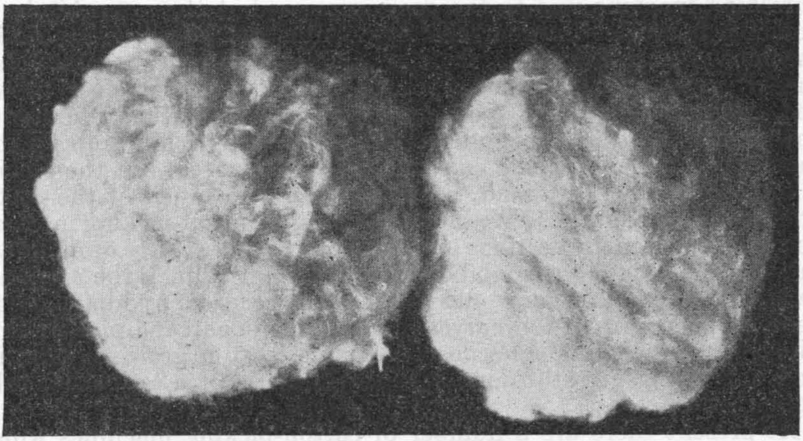

FIGURE 162.—Samples of lint from the same seed cotton, ginned by the sameme thod, conditioned to two ways. Sample (left) from ginning green and damp early seed cotton without drying; sample (right) from ginning same cotton after drying in Government drier. Note the improvement in preparation of the sample caused by drying the seed cotton before ginning

Artificial Cotton Driers

The development and use of artificial cotton driers during the last few years, particularly in 1931, have afforded a practical and economical means of successfully drying seed cotton. Dependable units in both homemade and factory-built designs have been developed by the Bureau of Agricultural Engineering and by several commercial concerns, with the result that growers and ginners now have a wide range of choice in drying equipment.

A striking example of the variation in preparation, one phase of cotton quality, is illustrated in Figure 162. The two effects here shown resulted from ginning two samples of the same seed cotton adjusted to two different conditions of moisture. The sample shown on the left illustrates what is known as rough preparation, which results from ginning the seed cotton in a so-called green and damp

state. This cotton is undesirable for spinning. The sample shown on the right illustrates a very smooth and desirable preparation, obtained from ginning the seed cotton after it had been conditioned in a drier at the department's experimental ginning plant at Stoneville, Miss.

The two samples illustrated in Figure 162 have been classed according to commercial trade practices and quality descriptions as follows: The sample on the left, Strict Middling grade, 1⅛-inch staple length, C preparation, neppy, irregular, stringy, and wasty; the one on the right, Strict Middling grade, 1$\frac{3}{16}$-inch staple length, B preparation, and only slightly neppy.

Good Effects of Drying Operation

In addition to the visible effects on the quality of the ginned lint, other beneficial effects were observed during the ginning of the two cottons. The seed from the artificially dried seed cotton were more completely cleaned than those from the damp seed cotton, and a better moting action was obtained with the former than with the latter. Ginning seed cotton with proper moisture content, therefore, appears not only to produce a product of better preparation, and frequently of better grade, but to eliminate many of the mechanical difficulties that arise in attempting to handle and gin damp seed cotton.

Additional laboratory analyses are being made on the various samples of seed cotton, ginned lint, linters, and seed that are coming from the department's experimental ginning plant. These samples represent the ginning of seed cotton of a wide range of qualities and of varying moisture content. They represent, also, varied mechanical organizations at the gin. The data are being accumulated and subjected to statistical analyses, which are expected to provide conclusions as to the optimum moisture content at which to gin each major type of seed cotton, with the range of mechanical organizations found in ginning equipment now in use or which will be developed in the future.

With the development and installation of driers, it seems highly probable that more efficient and successful ginning will result, and that it will be done more easily and economically than heretofore.

F. L. Gerdes, *Bureau of Agricultural Economics.*

SEED-COTTON DRYING PROVES PROFITABLE; TWO TYPES OF DRIERS USED

It has become a rather general practice for cotton planters to bring or send their seed cotton to the gins as soon as it is picked, regardless of the amount of moisture it may contain. This is due, in part, to improved roads and transportation facilities and to the fact that many of the plantations are no longer equipped with facilities for storing the whole crop or for drying it naturally. Consequently much of the early and so-called green cotton received at the gin is sappy, and much of the late cotton is rain soaked or dew laden, or both.

A series of investigations intended to develop simple and practical means for artificially drying damp seed cotton, in order to make ginning easier, simpler, and more economical and to improve the quality of the lint, has been carried on since 1926 by the Bureau of Agricultural Engineering. As a result of these investigations a definite process has

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been developed, now somewhat generally known as the Government process, which meets the special requirements for drying seed cotton and is adaptable to various types of cotton-drying equipment. In this process the damp seed cotton is subjected to a continuous current of hot air for from 45 seconds to 3 minutes, the temperature of the blast being held between the working limits of 160° and 200° F. and the amount of air between 40 and 100 cubic feet per pound of damp seed cotton. For the early green-sappy cottons, the lower temperatures of 160° to 175° seem most satisfactory, while the higher temperatures of 175° to 200° are generally used on late, rain-soaked cottons. Temperatures above 200° especially for the early cottons, appear likely to damage the cotton fiber. Therefore, until more information has been obtained from the studies under way or proposed, higher temperatures than 200° are not recommended.

From 1927 to 1930 the drying process was used in various designs of equipment, and two types of driers have been developed. In the first type, the seed cotton was dragged and rolled along four or six floors in a horizontal drying cabinet. In the later type the horizontal cabinet and conveyor chains are replaced by a vertical drying tower with no moving parts. These driers can be operated successfully in any kind of weather, if the dried cotton is conveyed immediately to the gin in the heated air. Extremely wet cotton is handled in the horizontal drier by reducing the speed at which the cotton is carried through the cabinet and in the vertical drier by passing it through the tower a second time.

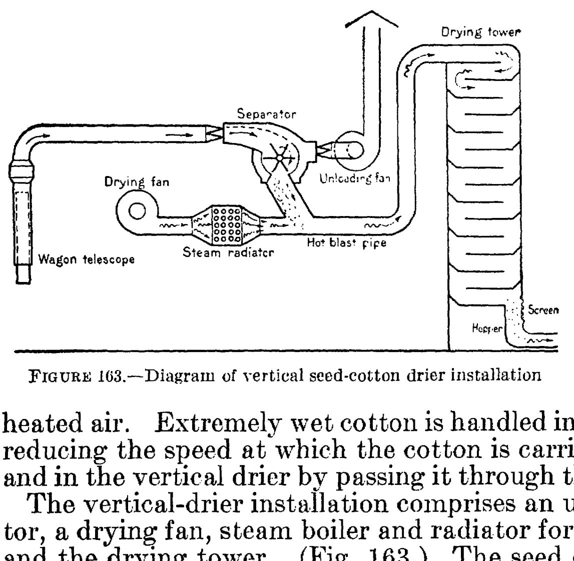

FIGURE 163.—Diagram of vertical seed-cotton drier installation

The vertical-drier installation comprises an unloading fan, a separator, a drying fan, steam boiler and radiator for heating the drying air, and the drying tower. (Fig. 163.) The seed cotton from the wagon telescope passes through the separator and into the blast of heated air, which carries it into the top of the tower. As the cotton is tumbled and rolled down over the 13 to 15 staggered floors in the tower, the excess moisture is evaporated. The blast carries away this moisture, together with considerable trash and dirt from the dried cotton, through the screens in the side of the hopper at the bottom of the tower. From this hopper the cotton is drawn by the regular suction of the gin.

The vertical drier is of simple construction and may be homemade in sizes having sufficient capacity to supply a 5-stand cotton gin. The space required is not too great to permit installing the drier in connection with the standard widths and heights of cotton gins. The drying tower may be built outside the gin building. (Fig. 164.) The power requirements are approximately 30 horsepower of steam at from 50 to 100 pounds pressure for heating the air, and about 30 belt horsepower from motors, engine, or tractor for operating the fans and separator. As the drying tower and all the auxiliary features are dependable and

simple, such a drier can be built cheaply and will have a long life with little attention.

The cost of artificial drying has ranged, as far as the department's engineers have observed the practical operation of such equipment, from 40 to 90 cents per bale, and the net increase in value of the cotton has ranged from 60 cents to as high as $5 or more per bale. Over 1,600 bales of damp seed cotton was commercially dried by one vertical drier in the 1931 season, and other gins reported having handled hundreds of bales each. A commercial 5–80 cotton gin, operating on long-staple cotton, reported that it has been successfully supplied

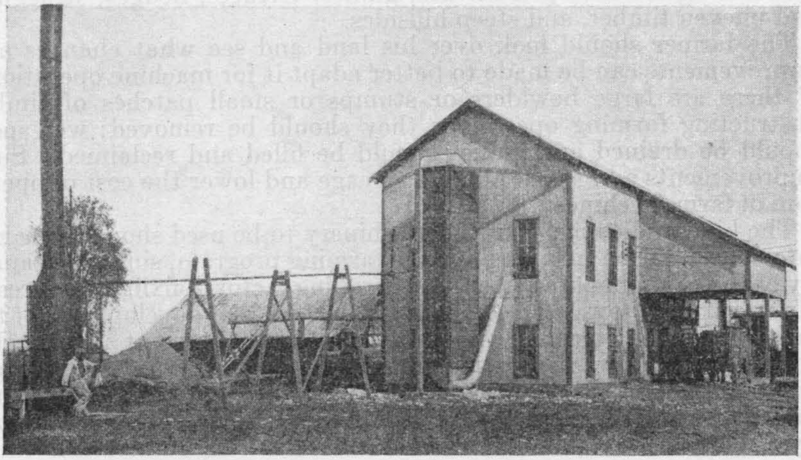

FIGURE 164.—Tower of vertical seed-cotton drier erected outside of gin building

with dry cotton from its homemade vertical drier, and that the capacity of the gin has also been increased about one bale per hour during the 1931 season.

CHARLES A. BENNETT, *Bureau of Agricultural Engineering.*

REMEDIABLE PHYSICAL CONDITION OF FARM OFTEN HAMPERS USE OF MACHINES

In order that crops may be grown at a minimum expense, the mechanical equipment used in seeding, cultivating, and harvesting must be adapted to the particular farm on which it is used and must be efficiently operated. Each farm presents a separate and distinct problem wherein the proper relations between kind and amount of crop, livestock, and machinery must be determined.

The physical condition of the fields where the machinery is to operate must be taken into consideration when determining the type and size of machinery which will fit into a balanced farm program. The ideal condition for the economical operation of any field machine is a large, level field, free of all obstructions. While even the simplest machines can do their best work in such a field, sufficient data are available to establish that under such conditions the larger machines generally are more efficient than small ones. But as the size and regularity of the field decrease, and as the number of obstructions

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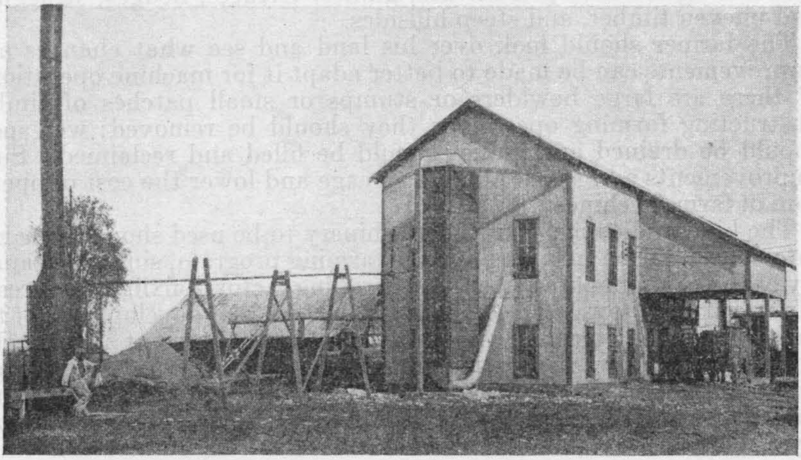

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increases, the size of the equipment that can be operated efficiently decreases until, at last, only 1-horse machinery is usable.

Except in certain sections of the West, it is probable that small, irregular fields are the rule rather than the exception. Recent surveys made by the Department of Agriculture show that on 11 typical farms in central North Carolina the average size of the fields is 3.7 acres; on 20 farms in as many counties in Georgia the average size of the fields is 5.6 acres; and on 11 farms in 6 counties in southeastern Minnesota the average size is 12.2 acres. The principal reasons for the smallness and irregularity of these fields are poor drainage, meandering creeks, open ditches, gullies, terraces, hedges, straggling and uneven timber, and steep hillsides.

The farmer should look over his land and see what changes and improvements can be made to better adapt it for machine operations. If there are large bowlders or stumps or small patches of timber obstructing farming operations they should be removed; wet spots should be drained and gullies should be filled and reclaimed. Such improvements add to the tillable acreage and lower the cost of operation of farm machines.

The kind and capacity of the machinery to be used should be taken into consideration in laying out the farming program, since the capacity of the equipment may be the controlling factor in fixing the acreage of the various crops. To some extent, the state of development of the machinery will determine what crops may be produced at a reasonable cost, since for some crops machinery has been developed for large-scale production through planting, cultivating, and harvesting, while for other crops only seeding, or seeding and cultivation, can be done by large machines.

Many Other Factors to Consider

On farms where a diversity of crops is practiced, many factors other than machinery must be considered in planning the cropping program. Often, these other factors are of sufficient importance to determine the crop rotations and the sizes of the fields, and in such cases the machinery used must conform to the cropping program. It is not always advisable to use the largest machinery units, even though their operation costs per acre may be lower than those of smaller machines. It is desirable to keep the original investment in machinery at the lowest reasonable figure. The overhead and depreciation costs of farm machinery are high because much of the machinery is used only a few days each year. The overhead charges may be reduced by so planning the cropping program as to give maximum employment to each piece of machinery and to avoid investment in unnecessary equipment.

In order than any machine may do its best toward reducing the costs of crop production, it must be efficiently operated. Not only must the field be of proper size, shape, and condition, but the machine must be handled with the idea of securing from it a maximum amount of work at reasonable cost. For instance, a tractor should be equipped with enough tools so that every time it crosses a field it will be doing the economical maximum amount of work. Note that it is the "economical maximum" and not the "absolute maximum" which is desirable, since it is possible to make the load too heavy for good operation. In harrowing, it is generally better to keep the width of the harrow to that which can be pulled by the tractor in high gear rather than to

increase the harrow width until low gear must be used. In cultivating row crops, as the load is increased by increasing the number of rows, there is a loss of flexibility in operation which may be very expensive in the long run. Economical operation of farm machinery is to be obtained only by determining the proper relation between amount and kind of work, the conditions under which the work must be done, and the amount and character of the equipment used.

A great aid in the efficient operation of farm machines is familiarity with their construction and operation, so that ordinary troubles can readily be located and remedied. This minimizes costly delays in rush seasons. Finally, the machines should be carefully housed when not in use and the parts likely to rust should be thoroughly greased. At the end of the season they should be thoroughly inspected and notes made of any repair parts needed so that repairs can be made during the off season.

GEORGE R. BOYD, *Bureau of Agricultural Engineering.*

TRACTOR'S ADAPTATION TO VARIED FARM OPERATIONS RAPID IN RECENT YEARS

Progress in the development of agricultural power and machinery during the last 25 years has been so great that to-day it is possible to operate a farm entirely without the use of animal power. Whereas formerly, plowing one furrow required the services of a man and a team of horses, to-day the same man may command a power unit capable of plowing several furrows at a time, and at faster speeds, without slowing down in hot weather and without the labor involved in caring for horses.

The first tractors were mainly adaptations of the stationary steam engine. They were cumbersome, and because of their ponderous weight they were ruinous to the soil and the ensuing crops. They were dangerous if in incompetent hands, and required constant attention. Hauling water and coal to supply the larger steam tractors, which could plow 8 and 10 furrows at a time, kept two teams and drivers busy continuously while the tractor was operating.

The first internal-combustion engine was made more than a century and a half ago, but it was not until 1876 that the Otto engine appeared. This was the first of the 4-stroke-cycle type, involving the principle upon which is built the internal-combustion engine of to-day. The intensive research and experimental work fostered by the rapid development of the automobile has contributed no small part to the refinements now found in gasoline tractor engine designs.

The first gasoline tractor, like the first steam tractor, was practically a stationary engine mounted on a frame supported on wheels and equipped with some sort of driving mechanism. The advantage of this mobile power plant over the steam tractor was soon recognized. However, there were yet many problems to be solved before the gasoline tractor would be practicable for general use on the farm. And these problems related not only to the mechanical details of mobility, cost, efficiency, and dependability but also to the development of adequate and economical supplies of liquid fuels.

Twenty-five years ago the gasoline tractor was large and cumbersome. The bore ranged from 8 to 10 inches, and the stroke around 15

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Twenty-five years ago the gasoline tractor was large and cumbersome. The bore ranged from 8 to 10 inches, and the stroke around 15

inches. The engine speed was low, about 200 to 250 revolutions per minute. The so-called make-and-break ignition and the constant-level or overflow type of carburetor or mixer were most generally used. The road and plowing speed rarely exceeded 2 miles per hour. Three or four furrows were plowed at one time.

Demand For Larger Power Units

The great Northwest was opening up at this time, with millions of acres to be put under plow. Consequently the demand was for larger power units. About 1909 2-cylinder tractors came into being. Four-cylinder tractors also appeared, which developed up to 80 horsepower and were capable of pulling 10 and 12 plow bottoms, but weighed as much as 25,000 pounds. A veritable road roller on the land! The bore of the cylinders was decreased and the engine speed was slightly increased, but the plowing speed was changed very little.

Toward 1912 the need of smaller power units became evident. The large, ponderous traction engines were not generally suitable for farm uses. Lower-powered, lighter-weight tractors with higher engine speeds appeared, having one and two cylinders, and in some instances with two road speeds. These would operate under more adverse conditions and in smaller fields. Moreover, they cost less than their heavy predecessors, and the smaller repair parts also cost less and were easier to install.

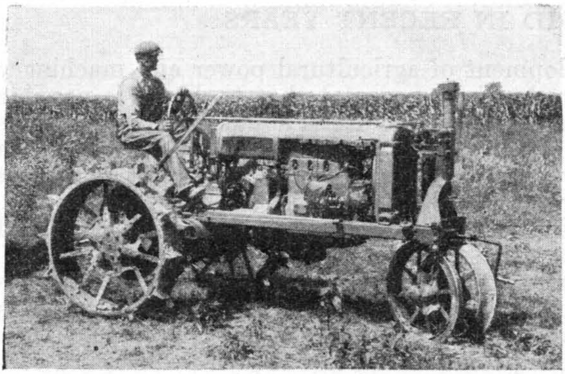

FIGURE 165.—General-purpose or row-crop tractor of common type

Four-cylinder tractors with vertical engines running at 1,000 revolutions per minute appeared in 1914, light in weight and having three forward speeds. At this increased engine speed the make-and-break ignition system proved to be inadequate, because of inertia effects of the moving parts and because of the effect on timing resulting from wear of the many parts that compose this system. The perfection of the high-tension ignition system overcame the difficulty. Better and more positive carburetion was likewise needed at this increased engine speed, hence the development of the float-feed carburetor principle in general use to-day. The World War accelerated the development of this type of tractor, because of the scarcity of man power, and 1-man outfits were put on the market. Two-cylinder tractors of lightweight construction also made their appearance.

The General-Purpose Machine

Since then the principal effort has been to adapt the tractor to performing all farm operations. It is worthy of note that a 30-horsepower tractor of to-day weighs approximately 3 tons, probably less than half as much as a tractor of equal power 20 years ago.

The power take-off was brought out in 1922. With that device, machines can be operated directly from the tractor and thereby relieved from dependence upon the ground-wheel drive. Previously, power was delivered by the tractor only at the belt pulley and at the drawbar.

The first general-purpose or row-crop tractor appeared about 1924, suitable in weight, power, and maneuverability for working on plowed ground, between crop rows, and in small fields. (Fig. 165.) Complete motorization of the farm was then possible. The expense of purchase, operation, and upkeep was sufficiently low to make the use of this tractor practicable on farms of moderate size.

The conventional general-purpose tractor is powered either by a 2-cylinder horizontal or a 4-cylinder vertical engine, mounted on a high-clearance chassis, with one or with two closely spaced guiding wheels in front and two driving wheels wide apart at the rear. The front wheels run between adjacent rows and the rear wheels straddle one or more rows. Because of the different row spacings required for different

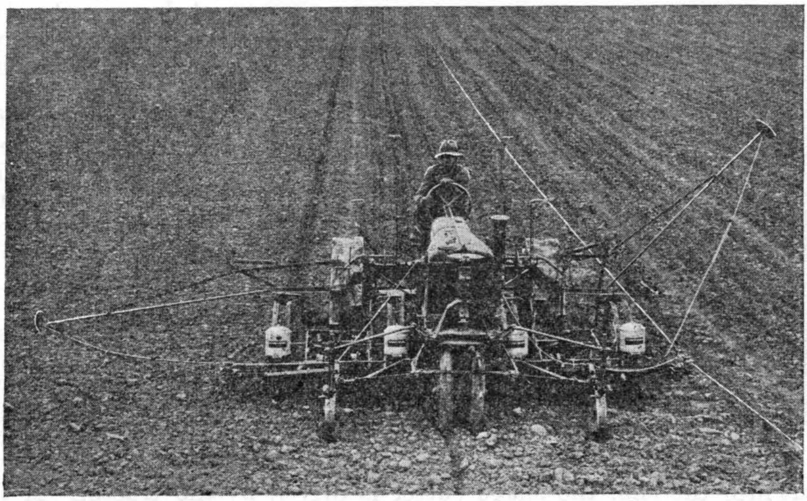

FIGURE 166.—General-purpose tractor with attachments, check-rowing four rows of corn at one time

crops, as well as the variation in spacing in the same crop in different localities, provision is made for adjusting the rear wheel tread. Wheel rim and lug equipment are variously designed to work to best advantage in different crops and in different soil types.

Attachments for Row-Crop Operations

Along with the development of this type of tractor came the development of attachments for performing the row-crop operations. In plowing and harrowing, the requisite tools are hitched to a drawbar that provides ample adjustment for operating them. For seeding small grains the drill may likewise be attached to the hitch bar. For seeding corn or cotton, attachments to the tractors are provided for check rowing (fig. 166), drilling, or listing up to four rows at one time. Fertilizer may be applied at the time of seeding by the use of a fertilizer attachment. After the crop has come up, cultivation until the crop is "laid by" may be continued with suitable implements pulled by the

tractor or with suitable tools attached to it. (Fig. 167.) Attachments are available for cultivating 2, 3, or 4 rows at a time. In spraying or dusting for insect control, as in dusting cotton or spraying potatoes, attachments may be mounted on the tractor and driven by the power take-off.

For cutting grass or hay crops, there are mower attachments driven by the power take-off, or two or more mowers may be pulled by the tractor. Sweeps and buck-rake attachments may be used for putting up the hay. Large grain binders are pulled by the tractor and operated by the power take-off. Small combines may be likewise operated from the power take-off; somewhat larger combines may be pulled by the general-purpose tractor while the mechanism is operated by a small auxiliary engine mounted on the combine. Corn binders are driven by the power take-off. Corn pickers are pulled by the tractor or, of different type, are mounted on it. Potatoes may be planted, cultivated, and harvested with tractor-operated machines. For threshing grain, for ensiling or husking corn, and for operating other belt-driven farm machinery, the general-purpose tractor is a convenient portable power generator.

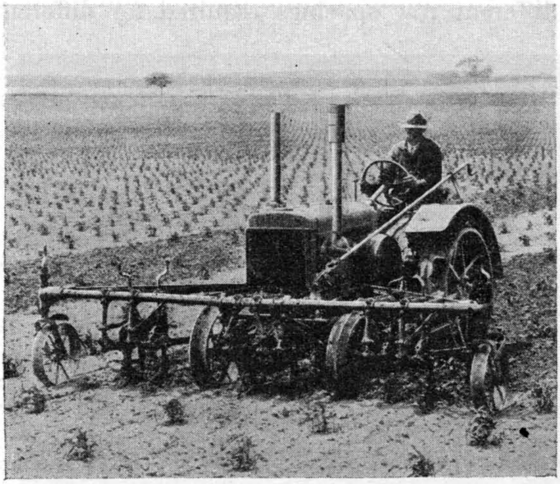

FIGURE 167.—Tractor cultivation of corn

If the grain is to be threshed by a stationary thresher, the separator and tractor may be quickly lined up and the work started. If corn is to be put into the silo, the silage cutter is driven by the tractor. If the corn is to be machine husked, the necessary belt power is easily supplied.

Garden Tractor Devised

For motorizing farms that are divided into very small fields, such as those devoted to raising truck crops, the so-called garden tractor has been devised. Most of these develop between one-half and 2 or 3 horsepower at the draw-bar, though a few are somewhat larger. The operator walks behind, and guides the tractor as he would a horse plow.

The aggregate power available on farms in the United States is about 50,000,000 horsepower, while the connected horsepower of the manufacturing industries is approximately 40,000,000. The mechanical power on farms amounts to about 30,000,000 horsepower. The major part of this is now supplied by 1,000,000 tractors, four times the number reported by the census of 1920. A large and ever-increasing proportion of these tractors is of the general-purpose type. Farm trucks provide about 15 per cent of the mechanical power on farms. The number of these has increased from 139,000 in 1919 to 767,000 in 1929,

according to the census. With the increase in number of tractors and trucks has come a large decrease in the number of horses and mules. According to the 1931 Yearbook, the number of these on farms, January 1, 1918, was 26,428,000, and on January 1, 1930, only 18,643,000.

R. B. GRAY, *Bureau of Agricultural Engineering.*

TILLAGE IMPLEMENTS OF NEW TYPES AND DESIGNS USED IN MODERN FARMING

Tillage machinery to-day comprises a vast number of different implements and tools necessary to meet the varied requirements of weed eradication, seed-bed preparation, cultivation, and other tillage operations essential to crop production. Furthermore, wide ranges of such factors as the size and kind of power unit, character of work to be done, soil type and condition, cropping system, and cultural practice require a multiplicity in both types and sizes of tillage equipment.

While a few crude implements were devised for tilling the soil in earlier periods, the active development leading up to present-day equipment began about the middle of the nineteenth century. By 1900, machines that were on the market embodied the fundamental principles of many modern tillage implements. Since that time development has been taking place at an ever-increasing rate. More recently the widespread use of the tractor, and especially the introduction of the general-purpose or row-crop tractor, not only called for a complete new line of implements but also opened up great opportunities for the inventor and the designer. A better understanding of the objects of tillage as well as of soil dynamics, and more fundamental information on the feeding habits of plants, have aided greatly in improving and standardizing soil-working tools. A greater knowledge of the treatment of metals has improved the quality and permitted the introduction of refinements in all classes of machines.

Distinctive Features in Modern Implements

Some of the distinctive features found among present-day implements are: Improved construction, better lubrication, durable metals for cutting edges and wearing surfaces, convenient and adequate adjustments, a large selection of interchangeable tools, easy manipulation, and power lifts for raising the tools.

The plow has always been the basic tillage implement. Plow bottoms are generally of either the moldboard or disk type and differ in size and shape for different conditions. Gang plows with two or more bottoms are available to correspond to the size of the power unit. Attachments are provided to aid in turning under crop residues and pulverizing the soil.

The vertical disk plow (fig. 168) was first introduced on a large scale in 1927. This plow has certain features of both the disk plow and disk harrow. A series of vertical disks is carried horizontally at an angle of approximately 45°. The angle of the gang may be changed to regulate the depth of penetration. The vertical disk plow was developed for plowing wheat lands in the Great Plains area but has been successfully used under other conditions. Because of its rigidity the

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plow is not well adapted to stony land. The furrow slice is not inverted and in grainfields the stubble is mixed with the soil, resulting in a ragged appearance. This, however, is an advantage in preventing soil from drifting and in obtaining good contact of the disturbed with the undisturbed soil. Draft is relatively light and rapid plowing can be done.

A combination plow and pulverizer known as the pulverator was introduced in 1928. This tillage implement is similar to a gang plow with short moldboards which only raise the furrow slice. By applying power direct from the tractor through the power take-off, slicing knives mounted on a vertical shaft at the rear of the moldboard are rotated rapidly against the furrow slice, which is thereby turned and pulverized. The soil is pulverized to form a uniform seed bed during the plowing, with comparatively small increase in power consumption.

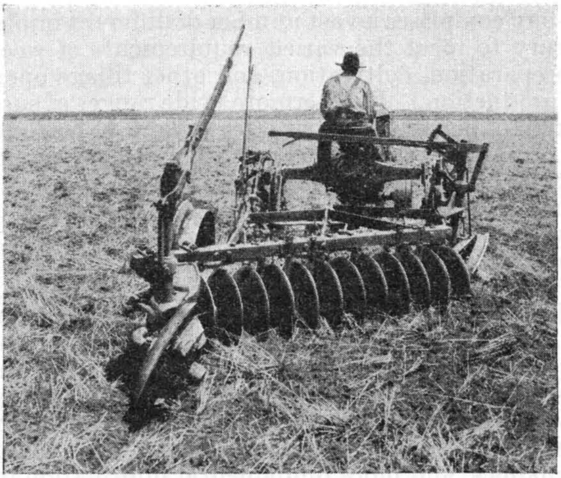

FIGURE 168.—A vertical disk plow operating on wheat-stubble land

Attempts at direct tillage of the soil with rotating blades, hooks, and other tools are successful under somewhat limited conditions. There are many plows for special purposes; they include subsoilers, listers, middle bursters, bedders, brush breakers, and hillside, cane, orchard, and vineyard plows.

Types of Disk Harrow

For preparing the seed bed after plowing, the disk harrow is very effective in breaking down furrow slices, particularly of sod, loosening firm soil, and destroying weeds. It is often used before plowing to cut up any crop residue or trash and to loosen the surface of the ground. The single-disk harrow has a left and right gang of either full or cutaway disks, the angles of which can be changed to obtain different depths of penetration. The soil is thrown toward either side of the machine, thus leaving a slight depression at the middle and ridges at the sides. The tandem-disk type has a second set of gangs attached at the rear, arranged to throw the soil toward the center; thus the soil is more thoroughly tilled and ridging is counteracted. Special types of such machines are built for use in orchards.

The spike-tooth or smoothing harrow has been universally used for many years to smooth and finely pulverize the soil. It is also used to break light crusts and to destroy sprouting weeds after a crop is planted. The more advanced type has levers by which the slope of the teeth may be changed. Another form of smoothing harrow has a curved knife-tooth.

The spring-tooth harrow is usually of the same general design as the spike-tooth harrow except that it is of heavier construction and the

teeth are long, curved, flat springs set to penetrate the soil. This implement is particularly adapted to stony land because of the elasticity of the teeth. Since the points of the teeth are curved forward, firm soil is readily penetrated and roots of objectionable weeds and grasses are brought to the surface. The work of either a disk or spike-tooth harrow can be approximated with a spring-tooth harrow by regulating the depth of penetration.

For crushing clods and firming the soil, rollers are available in different designs, such as smooth, corrugated (single and double cylinder), tubular, and "crowfoot."

Hitching Implements in Tandem

Two or more implements are frequently hitched in tandem for two reasons: (1) Several tillage operations are accomplished as one power unit travels over the field; and (2) tractor power is more efficiently utilized if a full load is drawn. In carrying this plan a step further, more than one of the standardized tillage mechanisms has been mounted on a single frame, or used in combination with seeding and fertilizing equipment.

Cultivators and weeders represent a class of machines ordinarily used after the crop has been planted. They are for loosening the soil, controlling weeds, ridging, and providing proper drainage. Distinguishing features of present cultivators are: Multiple-row units; many kinds of interchangeable shovels, blades, disks, and other tools; great adjustability; and suitable controls and guiding devices to permit cultivation close to the rows.

Cultivating equipment for row crops varies in capacity from one side of a single row for the 1-mule system of corn and cotton farming to the full width of 36 rows or more for large-scale tractor systems of truck farming. If a multiple-row cultivator is to be used, a planter of the same row size or multiple thereof must be used, and only rows that have been planted simultaneously can be covered by the cultivator at one time.

Horse-drawn cultivators of the ½, 1, and 2 row types for corn and crops of similar row-spacing have the improved features previously mentioned. but their general design is similar to that of earlier machines.

Motor Cultivators Introduced

In the use of mechanical power, motor cultivators have been introduced and one or more horse-drawn implements have been hitched behind the tractor. The general-purpose tractor recently introduced with suitable cultivating attachments, is readily adapted to the cultivation of various crops and different row spacings. A typical 4-row tractor cultivator is shown in Figure 169. The equipment, when mounted at the front of the tractor, permits direct guiding with the steering wheel, although on some machines the gangs may also be shifted. The gangs in some cases are raised by a power lift. Lister cultivators for tractors have guide wheels which follow in each furrow, thus permitting the mounting of hinged gangs at the rear of the tractor.

The rotary hoe used for early and shallow cultivation has only recently attracted much attention. It consists of two gangs of closely spaced, fingered wheels, free to rotate individually or in groups as the machine moves forward. (Fig. 170.) The hoes or fingers are curved

to penetrate and loosen the soil. The rotary hoe is operated over the growing crop without material injury to the plants. It is effective in breaking soil crusts and destroying sprouting weeds. Rapid cultivation is possible since the draft is light and the operating speed may be

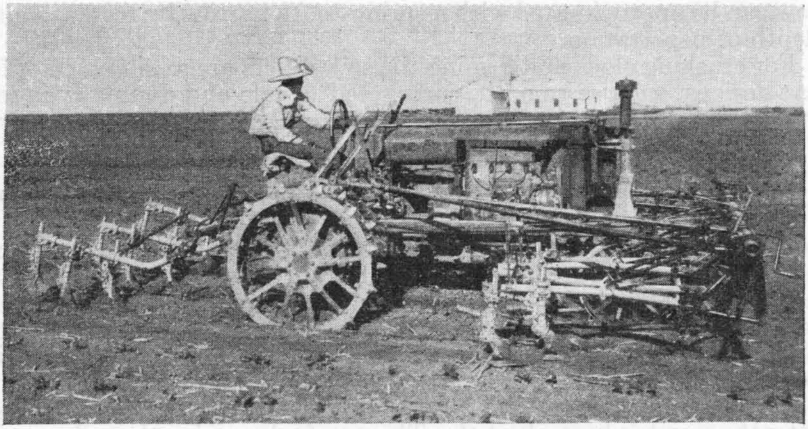

FIGURE 169.—Four-row cultivating equipment mounted on a general-purpose tractor

relatively high. Light weeders with one or three rows of long slender spring teeth are used in a similar manner and for the same purposes as the rotary hoe.

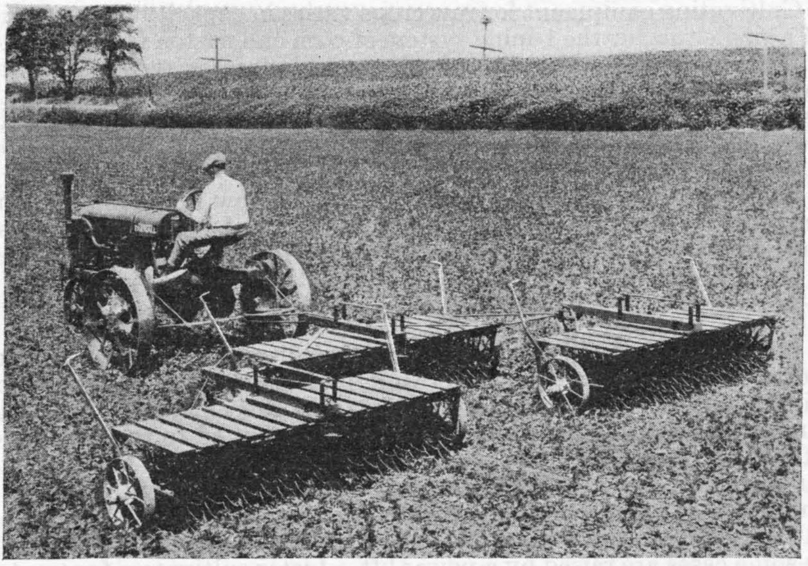

FIGURE 170.—Three rotary hoes cultivating young soybeans

Implements for Tilling Fallow Land

Among tillage implements for cultivating idle land in summer fallowing or after harvesting grain, the field cultivator either with stiff teeth or with duck-foot shovels is a late type. It is commonly built in sizes

of 6 to 12 feet width, and has a heavy frame with either rigid or spring tool shanks. The tools are staggered to permit some overlap of duckfoot shovels and to give sufficient clearance to prevent clogging. These cultivators thoroughly loosen the soil, form a clod mulch, and destroy any weed or plant growth, thus aiding to conserve moisture and in preventing soil drifting. Power lifts are provided for the larger machines.

Rod, knife, and other weeders of various types are also used for summer fallowing and similar work. The rods and knives extend continuously across the machine to insure the destruction of all plant growth. The most recent development is the rotary rod weeder in which a square rod revolves beneath the surface of the ground. The rotating motion is an aid in loosening the roots and in keeping the rod free of trash.

G. A. CUMINGS, *Bureau of Agricultural Engineering.*

SOME TYPES OF HARVESTING MACHINERY REACH HIGH STATE OF DEVELOPMENT

Harvesting machinery for small grain has probably reached a higher degree of perfection than machinery for harvesting any other crop. The physical characteristics of such crops and the large amount of hand labor originally involved are chiefly responsible for the progress which has been made. Although the reaper, header, and self-binder greatly lessened the work of caring for the crop, a great deal of labor was still necessary in threshing the grain after it was harvested. As a further aid in reducing labor there is now a machine—the combine harvester-thresher—which cuts and threshes the grain in one operation.

The combine was developed in California in an area where grain is grown under rather large-scale production methods. For this reason the early combines were large machines. When it was demonstrated that the combine could be used successfully in practically all areas where small grain is grown, small combines were soon in demand for the Middle West and East. Small combines were also in demand for harvesting soybeans, clover, and alfalfa, as these crops are often grown on farms where the acreage is not sufficient to justify the purchase of a large machine.

The Windrow Harvester

It was found that in some localities some crops could not be satisfactorily handled by the combine because of uneven ripening of the grain, the presence of weeds, or because of weather and insect hazards. The windrow harvester and pick-up attachments were developed to overcome these disadvantages. The windrower is in reality a header which deposits the cut grain in a windrow on the stubble rather than in a header barge. Under ordinary crop and weather conditions the stubble holds the cut grain up off the ground and any green weeds or damp grain will dry out in a few days. The pick-up is an attachment for the combine or for the combine platform and works in a manner similar to that of a hay loader. The cut grain is deposited on a conveyor and is threshed in the usual manner by the combine.

Some fundamental changes in design have also been attempted in order to produce a machine with fewer working parts and one which may be purchased and operated at a lower cost. However, the development of the combine is significant not only because it cuts and threshes

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of 6 to 12 feet width, and has a heavy frame with either rigid or spring tool shanks. The tools are staggered to permit some overlap of duck-foot shovels and to give sufficient clearance to prevent clogging. These cultivators thoroughly loosen the soil, form a clod mulch, and destroy any weed or plant growth, thus aiding to conserve moisture and in preventing soil drifting. Power lifts are provided for the larger machines.

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grain with less labor and expense than was formerly required but the first cost of a combine is often less than that of a threshing machine and the necessary harvesting equipment. From 1920 to 1930, inclusive, approximately 84,000 combines were sold in the United States.

The development and use of corn pickers, although not so spectacular as those of the combine, have been in progress for a number of years. The trend in design seems to be toward lighter but stronger machines of the 2-row tractor-operated type. Such pickers are operated by means of the power take-off, and are either pulled by a tractor or mounted on the tractor. While horse-drawn pickers are available, tractor power has proved quite satisfactory, in part because of the power take-off feature. The power take-off provides a more reliable form of power and a more uniform speed than power derived from a ground or bull wheel.

The combined harvester-thresher has had considerable influence on the design of corn pickers. At least one machine on the market is equipped with a tank to receive the corn from the husking rolls. Several attempts have been made to use the combined harvester-thresher for harvesting corn. Considerable work has also been done on a machine designed to harvest, husk, and shell corn from the standing stalk. Here again is seen an attempt to perform several operations with one machine.

The Cotton Harvester

The problems involved in the development of a successful mechanical cotton harvester are doubtless the most difficult of any which have confronted inventors and designers of agricultural implements. This is due largely to the physical characteristics of the cotton plant and to the wide variations in soil, weather, and crop conditions under which cotton is grown. There are at present two types of cotton harvesters in the experimental stage. The stripper harvester removes all of the crop at one operation, whereas the mechanical picker is designed to gather only the open cotton. The stripper is a comparatively simple and inexpensive machine, but it gathers a great deal of trash, leaves, and burrs along with the open cotton. Cleaners have been provided and changes made in the stripping mechanism to overcome these disadvantages. Considerable progress has been made along these lines but the use of the stripper harvester has been confined to northwest Texas, where conditions are more suitable for its use.

W. M. Hurst, *Bureau of Agricultural Engineering.*

ERODED AND TERRACED FARMS REQUIRE SPECIAL METHODS AND MACHINERY

A rather complete assortment of tractors and tractor-drawn and horse-drawn machinery is available for preparing the seed bed, planting, cultivating, and harvesting all kinds of grain and hay crops. The larger units of this machinery, such as 2-row, 3-row and 4-row cultivators, hay loaders, sweep rakes, 8 and 10 foot grain binders, and harvester-threshers cutting from 10 to 20 foot swaths are comparatively recent developments and do very satisfactory work on level or gently rolling land.

On more steeply rolling lands in parts of the country where severe erosion damage occurs, more difficulty has been experienced in the use of tractors and the larger units of machinery. Accordingly farmers on eroding lands have generally continued to use the smaller and lighter-weight machines which were universally used a generation or two ago. As a result, farmers on eroded lands are suffering a reduction in acre yields due to depletion of fertility by erosion and at the same time their acre costs of operation are high as compared to those of farmers able to use more efficient equipment.

The problem of developing machinery for economical cultivation of eroded or terraced land has not received a great deal of attention until recently.

Land subject to gully erosion is usually cut up by natural ditches or gullies into small fields of irregular shape. It is not unusual to see a 40-acre field cut into three or more patches. When such fields are planted to row crops there are likely to be a good many short "point" rows. It is usually considered that turning at the ends of such rows can be done more conveniently with single-row machines. If a 2-row or larger machine is to displace the single-row machine under these conditions, it must be designed to work out close to the ends of the rows and to turn around quickly in a small space.

On eroding land there are usually a good many small field ditches that are inconvenient to cross but still more inconvenient to go around. Small lightweight machines have some advantage in working over such ditches. With larger and heavier machines there is more inconvenience in crossing ditches and more danger of breakage.

Flexibility in Machines Essential

The ground surface is always uneven on eroding land because soil is carried away by water flowing down between crop rows or natural depressions. Unless machines have an unusual degree of flexibility, uneven ground surface causes uneven depth of penetration of seeding and cultivating machinery. This results in poor stands of crops and poor control of weeds. These difficulties are considerably increased with larger machines unless they are specially designed to give flexibility.

When traveling across the slope of the land, machinery tends to slip sideways downhill. This makes it difficult to follow crop rows. Unless specially designed for this condition, a 2-row cultivator is more difficult to manage than a single-row walking cultivator. In some localities crop rows are usually planted on contours; that is, the rows curve around the hill on level lines. Cultivators sometimes do not follow these curved rows accurately enough to prevent damage to the crop.

The difficulties mentioned above apply particularly to eroding land that has not been terraced. When the land is terraced the natural field ditches are eliminated. To this extent, terracing very materially improves conditions for the use of larger units of machinery. On the other hand, the terrace ridges themselves must be farmed and they offer some obstruction to the use of machinery. A machine that will successfully cultivate a terrace ridge must have a great deal more flexibility than is required for cultivating level land. (Fig. 171.) A single-row walking cultivator can work over terraces without difficulty (fig. 172), but 2-row cultivators are less flexible and are not always satisfactory for terraced land.

Steep Slopes Present Difficulty

The problem of designing machinery with enough flexibility to work satisfactorily over terraces might seem simple at first thought. There is no great difficulty in designing machines to work well on terraced land having slopes of 5 per cent or less, but much cultivated land is

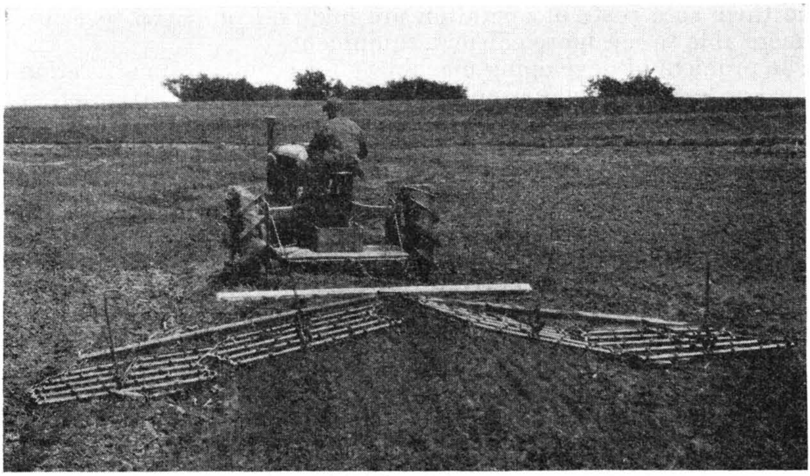

FIGURE 171.—Four-section harrow tilling top and sides of a terrace. A flexible assembly is necessary for satisfactory results

considerably steeper than 5 per cent. (The percentage of slope is the number of feet rise in 100 feet of horizontal distance.) In parts of the Corn Belt and general-farming regions, fields having 15 to 20 per cent slopes are not uncommon. In the wheat areas of the Northwest, slopes as steep as 60 per cent are under cultivation.

FIGURE 172.—Single-row cultivator with balanced frame operating satisfactorily across terraces

Until recently erosion has not been considered a serious problem on the wheat lands of the Northwest. No system of terracing for control of run-off on such steep slopes has yet been devised. Mangum terraces are not adapted to land having slopes much if any steeper than about 15 per cent. On terraced land with 15 per cent slope, machinery will require a high degree of flexibility in order to operate satisfactorily. Row-crop machinery will also require ability to stick to the side of the hill without slipping sideways. (Fig. 173.) The required degree of flexibility will be especially difficult to attain in hay machinery such as side-delivery rakes, sweep rakes, and hay loaders.

To solve the problem of adapting large machinery to necessary measures for control of erosion requires cooperation between machinery manufacturers and those who design terraces. The machinery manufacturer will need to go as far as he can economically go in adapting his machinery to the desired shape of terrace; then the farmer may have to modify the desired shape of terrace to meet the limitations in machinery design.

Farmers may also have to use more ingenuity in operating machinery over terraced land. Farmers in the Northwest have learned to operate large harvester-threshers on 60 per cent slopes, not terraced. Probably no greater difficulties will be involved in operating well-designed machinery over terraced land having 15 to 20 per cent slopes such as found in general farming regions.

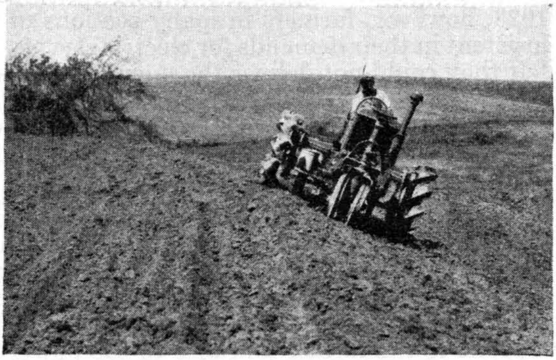

FIGURE 173.—Two-row tractor planter working along the lower slope of a terrace

It is evident that changes are necessary in methods of farming lands subject to severe erosion. If these lands are to continue in cultivation, erosion-control methods that will prevent soil destruction and make maintenance of fertility possible must be adopted. To operate this land profitably, it appears necessary also to provide efficient operating equipment that will enable farmers to produce crops at low cost.

CLAUDE K. SHEDD, *Bureau of Agricultural Engineering.*

RURAL ELECTRIFICATION GROWS AS FARMERS FIND NEW USES FOR ELECTRICITY

In this power age, no single agency has brought such comforts and conveniences to the farmer and his family as the use of electrical energy, which is now fast becoming an economic factor and a force for efficiency.

To-day about 1,000,000 farms are using electricity, supplied either by electric-power companies or by individual plants. Of this number, more than 644,500 have high-line electric service. This is 10 per cent of all farms in the country. It is nearly four times the number so served in 1923. Since that year there has been a steady increase in the number of farms served with electricity, and the last year's gain of 90,800 over the 1930 total is the greatest increase made in any one year. The estimated number of independent or unit farm-lighting plants is between 300,000 and 400,000.

As the farmers have learned the value of electricity, the consumption has likewise increased. During 1930, farmers bought 1,779,940 kilowatt-hours of electrical energy at a cost of $46,187,000, according to a recent report of the power industries. The consumption is equivalent to 2,385,000,000 horsepower-hours of energy reported as used annually by farmers.

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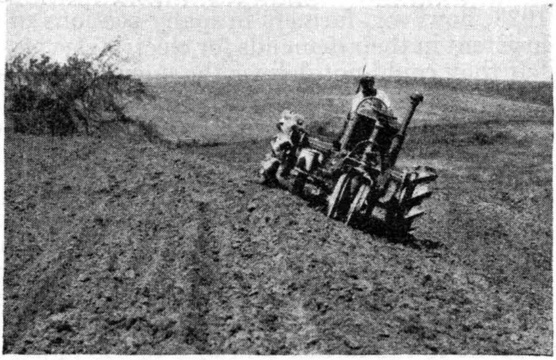

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Supplying electrical energy to farmers began about 1899, when a power company extended service to several small towns in California and contracted generally to supply power to farms for driving irrigation pumps. Between that time and 1910 the gasoline engine was gradually superseded by the electric motor, and since 1910 electricity has been the preferred power for irrigation pumping in California. Rural electrification has proceeded rapidly, until to-day it is estimated that between 60 and 80 per cent of all California farms have electric service.

Use of electricity on farms in other States developed less rapidly. The principal reasons doubtless were the larger average size of farms, with fewer users per mile of transmission line, and the lack of some general use like irrigation pumping for large amounts of power. By 1923, however, farmers in many sections of the country had become insistent in their demands for electric service, yet the utility companies felt they could not deliver the power at a price that the farmers could pay.

Committee Studies Problem

In furtherance of a common interest, a committee on the relation of electricity to agriculture was formed to study the problems of economical distribution of current in rural districts and of profitable use of electricity in agriculture. On the original committee were representatives of the power interests, of farm organizations, of manufacturers of electrical equipment, and of several governmental departments. It was recognized that rural electric service, to be a success, must yield a profit to the farmer and also to the power company.

The committee adopted a program of investigation to find out what electricity could do and what it could not do advantageously on the farm. The studies were conducted in cooperation with State agricultural experiment stations, where laboratory facilities and a trained personnel were available, and in the beginning were supported largely by contributions from private agencies. Where the studies have grown to major importance, State funds have been made available for continuing or enlarging them.

Prior to 1923 there was no organized program of research in electrification of farms. Some progress had been made in studying the use of electricity in pumping for irrigation and for drainage; in the dehydration of fruits, nuts, and hops; and in operating individual water systems and lighting plants. Little attention had been given to developing special uses in the farm home and about the farmstead.

Following the formation of the national committee, State committees were set up; in fact, such a committee was organized in Minnesota before the national committee. The State committees include representatives from agricultural experiment stations and agricultural extension services. They are devoting their efforts largely to the development and testing of equipment and methods for the immediate use of electricity on farms, and many have become extension agencies. Local conditions determine whether a committee puts primary emphasis upon research or upon extension work, or undertakes both lines of activity.

Information Widely Spread

As rapidly as experimental practices are proved satisfactory through research studies, the information is spread by demonstrations and other methods. Some activity in rural electrification is in progress by the agricultural colleges in 40 States, 14 of which have definite exten-

sion programs. Educational expansion programs in farm uses of electricity are increasing in agricultural colleges. Such programs have for their foundation the facts obtained through research.

Minnesota was the first State to have an experimental farm electric line. It reached nine farmers near Red Wing, whose farms were equipped with all kinds of electrical appliances, loaned by manufacturers, such as motors, feed grinders, electric stoves, milking machines, and vacuum cleaners—also pumps and water systems. This line and similar lines built in 15 other States furnished data on the uses and costs of electricity, and more farmers began to request the service. As a result, power companies and equipment manufacturers have seen fit to improve their services and products.

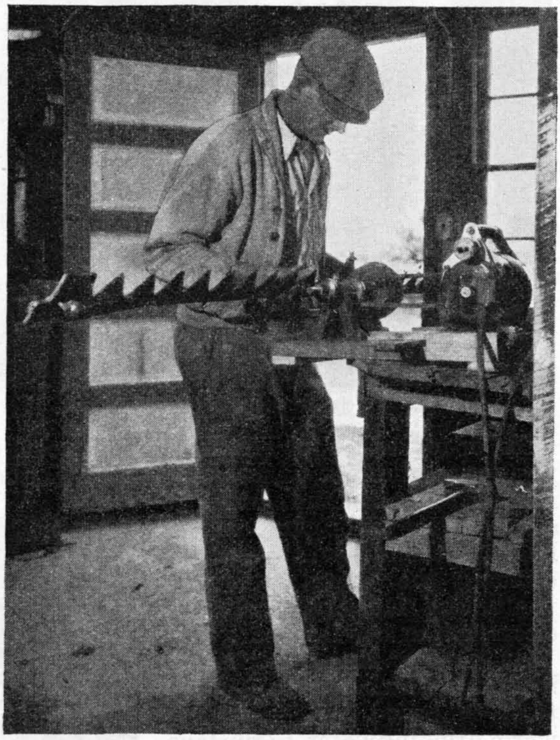

FIGURE 174.—Sharpening mower knives with portable-motor grinding rig

Since 1924, the power companies have improved their equipment to furnish 24-hour-per-day service. They are building farm lines more cheaply, and have discovered that, if the farmers of a community use electricity as it can be used, they will use as much power, and in many cases, more, than the average urban community of equal line mileage. Many electric light and power companies have installed rural-service departments to work with farmers on electrification, and to give advice on wiring farmsteads. They realize that inadequate wiring alone may limit the amount of electrical energy used to much less than the farmer could use profitably.

Manufacturers of equipment are cooperating with the agricultural engineers and the power companies and with the famers in designing and producing appliances at prices the farmer can pay. They are redesigning and improving such equipment as feed mills, silage cutters, brooders, and milk-cooling and storage plants. Some new equipment, such as poultry water heaters, has been designed. Manufacturers have redesigned their lines of power-operated equipment to make them suitable for electric-motor operation, and are making portable motors mounted on wheeled trucks, and smaller sizes that can be carried by hand. (Fig. 174.)

The popular uses for electricity on the farm are lighting, running small household appliances (fig. 175) and operating water systems

(fig. 176). Where availability of this convenient form of power has led to the installation of running water, it has done more than any other one thing to make farm living enjoyable. In designing household refrigerators and domestic water-supply systems, the makers are taking advantage of automatic control. Several feed-grinding plants also have been built with either automatic or semiautomatic controls.

FIGURE 175.—Corner of an electrified farm laundry

Supplanting Hand Labor in Dairying

Electricity is proving highly useful on many dairy farms, where it is taking the place of hand labor in doing burdensome chores. It runs the milking machine and drives the cream separator. It cools the milk, or makes ice for keeping the milk cool on the way to town. It pasteurizes the milk, washes and sterilizes the bottles and caps them. It runs the separator and churn. It sterilizes the milk cans, solders holes in them, heats water for cleaning the dairy, runs the ventilating fans, and helps in cleaning the cow stalls.

On poultry farms, electricity is used to hatch eggs in incubators, to brood the chicks, to warm drinking water, to run fans for ventilation and for drying litters, to sprout oats for green feed, and to operate a spray gun in killing vermin. An electric motor runs the feed grinder, mixes the feed, cleans the grain, and elevates feed or grain into the bins. A very general use of electricity is for lights to prolong the feeding period and secure increased egg production during the winter.

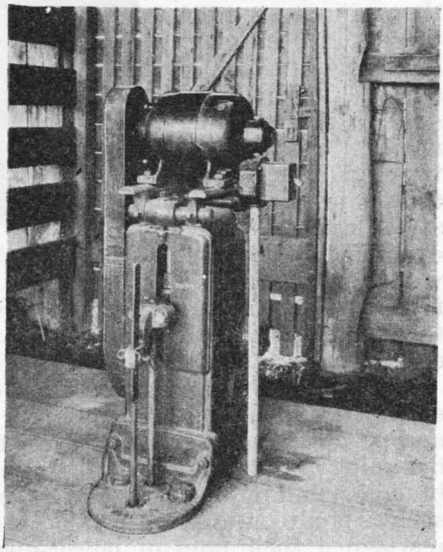

FIGURE 176.—Electrically operated farm pump, with automatic shut-off switch

Large fruit farms are using electricity in spraying, fruit washing and grading, cider pressing, and refrigeration in cold-storage plants.

Among the more recent uses of electrical energy is the heating of soils and hotbeds. Some experimental work in these lines has been

conducted by several agricultural experiment stations, with promising results. Electricity has been found particularly useful in operating equipment for dehydrating crops where close regulation of temperatures must be maintained.

In the use of electricity for heating soils and hotbeds, Norwegian and Swedish engineers were the pioneers. Farms in many European countries, particularly Germany, Norway, and Sweden, are supplied with central-station service, and electricity is used for lights and many small power applications about the farmsteads. Sweden has thousands of electrically operated threshing rigs. Much of the research pertaining to the use of electricity in agriculture has been initiated outside of the United States, and includes electric plowing in France, silage making in Germany, soil heating in Norway, and electric seed treatment in Australia. The latter country offers available electricity as one of its chief inducements to attract farmers.

S. H. McCrory, *Bureau of Agricultural Engineering.*

AMERICAN MACHINERY IS INFLUENCING AGRICULTURE GREATLY IN OTHER LANDS

The design and development of farm machinery and the application of mechanical power in agriculture in the United States have been reflected, to a greater or less degree, in the changing agricultural practices in other lands. The use of American-made machines, and the changes in foreign designs to correspond, have contributed in no small way to the adoption of more efficient methods in producing crops.

This change was considerably accelerated by the World War, which drew heavily on the able-bodied man power of the farms of Europe. The urge for greater accomplishments by one pair of hands became paramount. Tractors, tractor plows, and other power machinery were imported, mainly from North America, to increase the output of the average worker. Adoption of such equipment has involved radical change or abandonment of many time-worn customs suited only to small-scale production, in order to operate on a larger scale. Small fields, in many instances smaller than 5 acres and adapted only for horse-drawn machines, were joined. This required the filling of drainage ditches, the removal of hedges and stone fences, and often the utilization of land that had not been cultivated for centuries; all to permit of using the more efficient power and machinery methods.

At the close of the war, the increased living costs resulted in a demand by farm labor for higher wages. This condition hastened the adoption of labor-saving agricultural machinery, until now nearly every country in western civilization uses American machinery and methods.

One-Man Outfit Adopted

Before tractors were used extensively in Europe, the plows in common use cut furrows less than 12 inches wide. If pulled by tractors the plows were, in many cases, adaptations of horse-drawn equipment and two men were required to operate them—one to drive the tractor, the other to ride the plow. With the arrival of American tractors and plows, 1-man outfits were available, as the plows were of the self-lift type and could be adjusted from the tractor-driver's seat by easily

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Before tractors were used extensively in Europe, the plows in common use cut furrows less than 12 inches wide. If pulled by tractors the plows were, in many cases, adaptations of horse-drawn equipment and two men were required to operate them—one to drive the tractor, the other to ride the plow. With the arrival of American tractors and plows, 1-man outfits were available, as the plows were of the self-lift type and could be adjusted from the tractor-driver's seat by easily

accessible levers. The plows cut 14-inch furrows, and in many cases they were fitted with rolling colters, a radical departure for Europe. Considerable objection was raised at first because of the extra width of furrow, the type of share and moldboard, and the colter; however, the 1-man outfit was soon accepted as economical.

To keep pace with the advancement in tillage equipment and to utilize the power available in the tractor, larger seeding units were needed; 8-foot and 10-foot drills, in many instances hitched in twos, threes, and fives, speeded up the planting of grain. The cultivating equipment already in use in Europe was less difficult to adapt to use with the larger power units. Existing implements were hitched together fairly successfully, although some American machinery appeared, including the rotary hoe and spring-tooth and disk harrows.

For grain harvesting, the binder of American origin was introduced. At first it was used singly, but when tractor power became available hitches were devised that permitted hauling as many as six 8-foot binders at one time. This was necessary to keep in step with the large-scale tilling and seeding operations noted above. Threshing formerly was done by the European thresher of practically all-wooden construction, which was fitted with a fluted bar-type cylinder. With this machine probably only 400 bushels per day could be threshed. In certain parts of Europe this type of thresher is gradually being superseded by that used in North America, with all-steel body and spike-tooth cylinder.

American Type Haying Tools Used

For handling forage and hay crops, tractor-mower attachments have been adopted, together with other American-type haying tools. Hay balers, capable of baling hay or straw into more compact units than was previously possible, have come into use in some regions. This has aided handling and has minimized the storage space requirement. Hay driers are in use in some places, to a limited extent.

Because of the wide application and the practicability of the combine harvester-thresher in the United States, a number of the foreign countries have appreciated its worth and imported such machines. Some have even started to manufacture them. Great Britain, Germany, and Russia are harvesting considerable acreages of grain with this creation of the New World. With the advent abroad of this machine there arose, as in the central and eastern parts of the United States, a need for grain driers. Investigations of equipment for this purpose are in progress, and a few driers are in regular use.

Many other machines and operations have been affected by developments in the United States. Among these is machinery for the production and harvesting of sugar beets and of potatoes, also machinery including the silo filler, used in the production and processing of corn. The manure spreader is another machine of American development that has been adopted in Europe. Formerly manure was pitched from the barnyard into the wagon, taken to the field, and dumped in piles from which it was laboriously spread with pitchforks. On the more modern farms litter carriers and manure spreaders have been introduced, thereby reducing the amount of labor required and making possible the more uniform application of the manure to the land.

Applications of Electricity

As a result of the intensive studies and adaptations for using electricity on farms in the United States, certain applications have spread abroad. Some types of crop driers now make use of this power. Some milking machines are also operated by electricity. Some Europeans have gone a step farther than Americans, however, in rural electrification, and have developed a practical cable plowing outfit.

Adaptations and applications of the agricultural machines that have been mentioned may be found in many quarters of the globe, and their use is becoming more general and is extending into new regions. Although this discussion applies mainly to Great Britain and continental Europe, American machines and methods have penetrated to Egypt where tractors are used in leveling for rice growing and a wide variety of agricultural tools and corresponding practices have been adopted, and to South America, where harvesting is carried on in Yankee fashion.

The importance attached to our part in increasing production and reducing costs in agriculture is clearly emphasized by the exhaustive tests being made of American machines at the more important foreign agricultural experiment stations. Our exports of farm equipment reached a maximum value of $112,870,000 in 1929. This was roughly one-fourth the value of all farm equipment sold by United States manufacturers in that year. More than half of this export value was in tractors, and more than one-fourth in harvesting machinery, plows, and listers. Agricultural engineers and others from many lands are studying American farming practices, which shows that American resourcefulness and ingenuity are greatly influencing the agricultural readjustment of the world, and that the progress made on farm machinery in the United States is being keenly watched abroad.

R. B. Gray, *Bureau of Agricultural Engineering.*

OUR LAND USE PROBLEM

LAND-UTILIZATION PROBLEM, INTENSIFIED BY DEPRESSION, DEMANDS NATIONAL POLICY

The expression "land utilization," formerly principally a technical term, has come to have significance for the average citizen. During the last decade more and more interest in the problems of land utilization has developed.

This awakened interest grows out of a number of significant changes in the rural economy of the Nation. Formerly our national outlook was unlimited increase of population and a continually increasing pressure on available land resources. Even a decade ago the food shortages of the World War, wrongly attributed to scarcity of land rather than to scarcity of labor, gave rise to extensive plans for stimulating agricultural expansion.

This outlook has been materially altered during the last decade, as is brought out in more detail in other articles of this YEARBOOK. Birth control, under the impulse of urban standards of living, and restrictions on immigration forecast an ultimate population probably not more than 20,000,000 greater than at present—a population that may even decrease in time. The increase of populations of other industrial nations, comprising hitherto the best markets for American farm products, shows similar tendencies, and the export markets for our farm products have been materially restricted by foreign trade policies and credit dislocations. Competition in our export markets and even in our domestic market has been intensified by the expansion of farming into semiarid areas, extensive land reclamation in various countries, the recovery of European agriculture including that of Russia, and the increased production of tropical products. Throughout the civilized world national policies have aimed at stimulating agricultural expansion. Much crop and pasture land in our own country has been economized through the substitution of mechanical power for horse power. There has been a notable expansion of our farming area in the Great Plains and through the reclaiming of fertile areas with favorable topography in various parts of the country, at the expense of less-favored lands formerly advantageously cultivated.

Our outlook with regard to what our lands will be needed for and can be used for has been profoundly altered by these developments, as well as by a better knowledge of our potential land resources. We now know that, in the present century at least, we shall not need to cultivate quite half of our potential arable acreage and that we can

devote more than one-fourth of our total land surface to forests, wild-life refuges, or other uses, without encroaching seriously on land required for crops and pasture.

Problem Emphasized by Prolonged Depression

A decade of subnormal economic conditions in agriculture, culminating in a drop into probably the deepest abyss of depression American farmers have ever experienced, has created serious problems of adjustment in land utilization, especially in those sections where topography, soil, and climate are not especially favorable to present-day methods of farming. Extensive areas of farm land have become tax delinquent or have been abandoned. In many of these regions tax delinquency is further increased by the presence of large areas of cut-over land on which the owners are no longer able or willing to pay taxes. Tax delinquency and farm abandonment, in turn, have created serious financial problems for townships, counties, and States. As revenues are reduced, the burden of taxation is increased for those farmers and timber owners who remain, and the justification for maintaining certain schools and roads in areas where the population is thinning frequently becomes questionable.

The solution of this extensive problem of idle lands will require the cooperation of Federal, State, and local governments. For one thing, it is wholly illogical to continue the policy of attempting to resell foreclosed lands not adapted to private utilization, in accordance with the immemorial practice of most of the States. Few States at present have any systematic program for administering the large areas of tax-delinquent lands that they are being forced to take over and retain through lack of a market. In some States such lands are taken over by the State itself, in other cases by the counties, or even by townships or minor civil divisions. Many of the units of local government neither can afford to lose the revenues from the tax-delinquent lands nor are competent or financially able to undertake the administration of large areas of idle land. This does not mean that in some instances the development of county forests or parks may not be desirable, but merely that units of local government in general are quite incapable of dealing adequately with the problem of idle land as a whole.

Tax Problems Attacked Along Several Lines

It is clear that the idle-land problem interpenetrates the whole difficult problem of State and local taxation. It is generally recognized that rural real estate is bearing a disproportionate share of the total State and local tax burden. In many cases private utilization of land is being penalized and lands forced into tax delinquency which could continue in private ownership under a more moderate tax burden. The solution of these problems will require a number of lines of action, some of which have already been undertaken in certain States. These include:

(1) Assumption by the State of part of the cost of local government in order to lighten the burden on rural real estate.

(2) Better adjustment of the tax burden in accordance with the tax-bearing capacity of various classes of land.

(3) Economics in local government through—(*a*) elimination of schools and roads in sparsely settled areas, this perhaps depending upon

a program of encouraging the complete abandonment of residence in such areas and zoning against resettlement; (*b*) increasing the efficiency of local offices and services so as to reduce costs; (*c*) consolidation of functions either through the cooperation of counties or through combining them in larger units.

Public-Ownership Program

After all these various adjustments are made, however, it is becoming clear that we shall have to provide for a larger program of public ownership of land. This grows out of the fact that in our earlier land policy we threw into private ownership lands which should have been retained for public advantage. For one thing, there is a large acreage that falls below the margin of profitable private utilization. This is the case with much of the cut-over land and with a good deal of the poorer farm land, especially where the fertility has been impaired by erosion or overcropping. We have permitted private individuals to skim the cream, and now we shall be forced to dispose of the skim milk. Furthermore, there are classes of land that can not continue in private ownership without a detriment to public welfare. Such lands include: (1) Farms in sparsely settled areas which entail unduly high costs for the maintenance of public institutions and services; (2) lands that can not be profitably utilized by private individuals without serious soil wastage; (3) lands that should be retained in forests or pasture in order to protect watersheds; (4) timbered areas that should be managed on a permanent-yield basis because the local agriculture and industry are essentially dependent on a continuous supply of timber; (5) bird and game refuges; (6) areas especially adapted to serve as recreational areas which should be preserved for public use as Federal, State, and local parks; (7) lands that periodically are thrown into cultivation in periods of high prices or unusual rainfall but are not adapted to permanent cultivation; (8) miscellaneous areas needed for various public uses, such as military reservations, water power and reservoir sites, etc.

Guidance of Land Settlement

Another important element in national land policy is the more adequate guidance of land utilization and settlement. It is generally recognized that past and present methods of land settlement result in serious mistakes and are extremely wasteful both of land resources and of human life and effort. A vast amount of money has been wasted also in the development of ill-advised drainage and irrigation projects, as well as in land settlement by private individuals. The continued application of our homestead policy to areas incapable of maintaining a family on the amount of land allotted, also leads individuals into futile and costly attempts at land settlement, besides injuring the established range industry.

The essential basis of all the various types of readjustment that have been mentioned in this article is an official economic classification of land to determine what class of use it is best adapted to, and whether it is best suited for private or public ownership and utilization. Such a classification should be modified from time to time as conditions change.

We have also reached the parting of the ways in the matter of reclamation policy. It is frankly admitted by advocates of Federal reclamation that the areas remaining to be reclaimed by irrigation can not be reclaimed at costs that can be supported by farming alone without some form of governmental subsidy. It is being proposed that, in addition to granting interest-free funds, as in the past, the Government subsidize reclamation further by utilizing the revenue derived from power developments. There is active agitation for the extension of Federal reclamation to the drainage of lands in the humid sections of the country, more or less in connection with flood-control projects. In the next few years the American people will need to determine whether Federal and State land policies shall be directed toward the stimulation of agricultural expansion or whether such stimulation is justified in view of the perennial tendency toward overexpansion.

Consolidation of Scattered Holdings

Another important task is the consolidation of scattering land holdings which are not sufficiently compact or of a size adequate for economical utilization. The homestead policy and grants of alternate sections to railways and scattering sections to States has resulted in thousands of units in dispersed ownership, Federal, State, and private, frequently by absentees. Bringing together these scattering holdings into units adapted to economical use or administration will be an important objective in future land policy.

The remaining public domain itself, now utilized as a grazing commons, has been subjected in many places to a régime of competitive grazing which has seriously depleted the forage cover, resulting in increased erosion and contributing to the severity of flood devastation, not to speak of the confusion and uncertainty to which the livestock business has been subjected. Opinions differ as to whether the solution will consist in turning these lands over to the States in which they lie, after reserving certain areas for Federal retention, or whether it should take the form of regulated utilization under Federal auspices. A presidential commission has recently recommended in substance the first-mentioned policy.

L. C. Gray, *Bureau of Agricultural Economics.*

NATIONAL CONFERENCE RECOMMENDS PROGRAM OF STUDY AND ACTION

The National Conference on Land Utilization held at Chicago, November 19 to 21, 1931, was probably the first important gathering in the history of the United States to outline a comprehensive national land policy, as distinguished from topical or regional segments of a policy. The conference was called by Arthur M. Hyde, Secretary of Agriculture, in collaboration with the Association of Land Grant Colleges and Universities.

Representatives were present from the United States Department of Agriculture, most of the land-grant colleges and universities, the Federal Farm Board, the Bureau of Reclamation, the Federal Farm Loan Board, the Federal Board for Vocational Education, the Asso-

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ciation of Commissioners and Secretaries of Agriculture, the leading national farm organizations, a score of the most important railway systems, the Chamber of Commerce of the United States, and about two score organizations concerned with banking, insurance, forestry and conservation, land economics, engineering, and the farm and news press. Probably no more widely representative and experienced group ever met for the consideration of national land problems. More than 350 delegates were registered.

The program of the conference provided for two days of addresses, papers, and informal discussions, and a third day devoted to the consideration and adoption of recommendations of the conference, formulated by a broadly representative committee. The proceedings of the conference, which include addresses by the Secretary of Agriculture, the chairman of the Federal Farm Board, and a large number of papers by foremost authorities on land problems, constitute a comprehensive and significant manual on the subject of land policy.

Significant Recommendations Adopted

The conference adopted a group of significant recommendations as the majority sentiment of its membership. In general, these recommendations look toward the rationalization of agricultural production and land utilization, the conservation of national resources, and the safeguarding of the national welfare in the use of land.

The conference recommended Federal administration of the public domain, with a view to the rehabilitation of public ranges and the protection of watersheds; the consolidation of scattering State and Federal holdings through exchange; the expansion of the outlook program of the United States Department of Agriculture, an inventory of land resources and an economic land-use classification as a basis of land policy; restriction of homesteading to lands capable of maintaining a decent standard of living on the maximum area granted; tax reform to relieve the excessive burden on farm and forest land and adjust taxation to the type of utilization for which each class of land is adapted and to its tax-bearing ability; licensing and regulation of land-settlement enterprises; restriction of Federal reclamation to the completion of projects already started and the rehabilitation of deficient water rights on lands now cultivated and occupied, with no new reclamation projects to be initated until justified by the agricultural needs of the Nation; steps for the prevention or reduction of soil erosion and other forms of soil depletion.

The conference devoted special attention to the problem of submarginal land. It recommended the coordination of State and Federal policies to withdraw submarginal crop lands from cultivation and utilize them as forests, game refuges, and other purposes. In this connection the conference recognized the need for discontinuing the resale of tax-delinquent land not adapted to cultivation and the necessity for a broader program of Federal and State acquisition and administration of lands not adapted to profitable utilization by private enterprise.

Two Permanent Committees Recommended

In order to insure the carrying out of its recommendations the conference requested the Secretary of Agriculture to take steps for setting

up two permanent committees, namely, a national land use planning committee and a national advisory and legislative committee on land use. The membership of the first committee, which is a technical body, is to include representatives from various Federal bureaus dealing with rural lands, and representatives of the Association of Land Grant Colleges and Universities. The advisory and legislative committee will comprise representatives from the principal national farm organizations, the Chamber of Commerce of the United States, the National Association of Commissioners and Secretaries of Agriculture, the American Forestry Association, the American Agriculture Editors' Association, the American Railway Development Association, the National Sheep and Wool Growers, and the National Livestock Association.

L. C. GRAY, *Bureau of Agricultural Economics.*

PRESENT TRENDS INDICATE FARM AREA OF UNITED STATES NOT LIKELY TO INCREASE MUCH

In studying the land problem the first step is to consider the probable future need for farm land. This is dependent, obviously, upon the future consumption of farm products, on the one hand, and upon production per acre on the other hand. Let us consider first the prospect for consumption of farm products. This depends, in turn, upon three factors, population growth in the United States, consumption per person, and exports.

The most important of the factors affecting the future need for farm land is the Nation's population. At present over 90 per cent of the farm land is used to produce for the domestic market. Ten years ago, indeed as late as 1923, the population of the Nation was increasing nearly 2,000,000 a year. Now the increase is scarcely 900,000. (Fig. 177.) Between 1921 and 1931 the number of children born in the United States dropped from about 2,940,000 to about 2,300,000, net immigration declined from 300,000 in 1921 and 1922 to a net loss of over 70,000 in 1931 (emigrants exceeded immigrants), and the number of deaths increased. The increase in deaths was not because people were dying younger, but because there is an increasing number of old people. The number of people over 65 years of age increased 34 per cent between 1920 and 1930, according to the census, whereas the number of children under 5 years of age decreased 1 per cent. Because of the increasing number of old people, deaths will almost certainly increase more rapidly in the future.

The prospect is for an increase in population during the next 10 years of about half that shown by the census for the decade 1920–1930, unless the immigration restrictions are relaxed; for an increase in the decade 1940–1950 only about a third as large as that in the past decade; and for a stationary population about 1960. This stationary condition will persist for a decade or more and may be followed by a decline. In other words, the maximum population of the Nation in the future, unless births or immigrants increase, will be only 15 to 20 per cent greater than at present. This increase, though spread through three decades, is about the same as that during the past decade.

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Consumption Per Person

Consumption of farm products per capita has remained remarkably constant for 30 years at least. In two years during the World War it sank about 4 per cent beneath the level at the beginning of the century (average for 1897–1901), and during two years of urban prosperity, 1926 and 1928, it rose about 6 per cent above this level. During the year 1930, despite the economic depression, consumption of farm products per person was a little above (about 1 per cent) the 1897–1901 level. This variation in per capita consumption is not caused primarily by people's eating more food, on the average, but to a smaller or greater consumption of the more expensive foods, principally meat and milk, with corresponding changes in the less expensive foods, principally the cereals. In view of the rapid approach of a stationary population, unless the immigration restrictions are relaxed, it appears

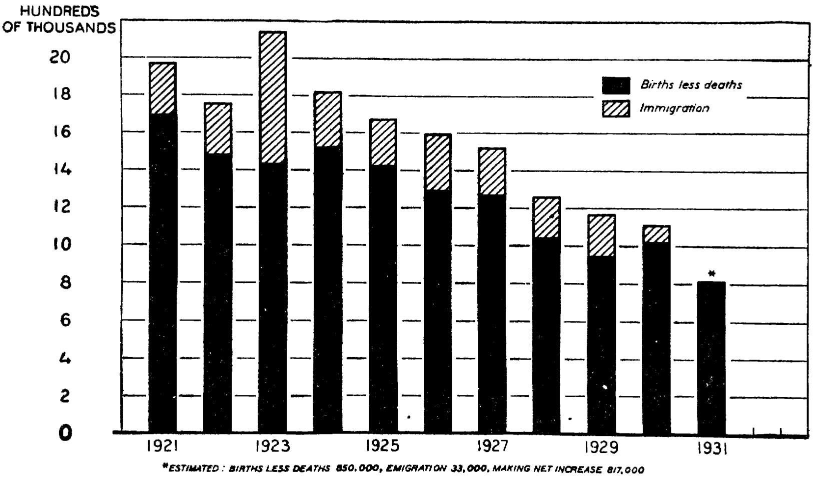

FIGURE 177.—Population increase in the United States, 1921–1931. Ten years ago the population of the United States was increasing by nearly 2,000,000 a year. Now the increase is 1,000,000 or less. Births were 2,800,000 or more annually as late as 1925, but by 1931 had fallen to about 2,300,000; while deaths have increased from about 1,300,000 to 1,400,000. Net immigration has been reduced from about 300,000 in 1921 and 1922, and over 700,000 in 1923, to a net loss of more than 70,000 in 1931. A stationary population is approaching with much greater rapidity than anyone surmised five years ago was possible.

unlikely that per capita consumption of farm products will vary much, if any, more in the future than in the past. In other words, total domestic consumption of farm products in the future is likely to depend primarily on population.

The Trend of Exports

In recent years (since 1927) exports have constituted only about 10 per cent of the value of net agricultural production in the United States and have required about the same percentage of the crop land for their production. (Fig. 178.) This is only about two-thirds as large a proportion as that of a decade earlier. In northwestern Europe, where most of the exports have gone in the past, the birth rate has been declining rapidly, until in most of the countries it will scarcely maintain population permanently; and in England, Germany, and Sweden not enough daughters are being born to replace the

mothers of the present day. On the other hand, agricultural technic is advancing in northern Europe as in North America, and production is increasing.

Moreover, the intensification of the nationalistic spirit which accompanied the World War, and the consequent desire for national security in food supply, brought in, like an undertow, a notable wave of tariff enactments. In Germany the tariff on wheat is $1.63 a bushel, while in France and Italy, although not so high, it is practically prohibitive. Even Great Britain, the greatest foreign market for American farm products, seems likely to adopt soon a tariff on many farm products. Only to the Orient are exports of farm products increasing.

Whether exports to Europe will increase with recovery from the economic depression, or whether eastern Asia will be able to buy enough farm products in the future to counterbalance the recent de-

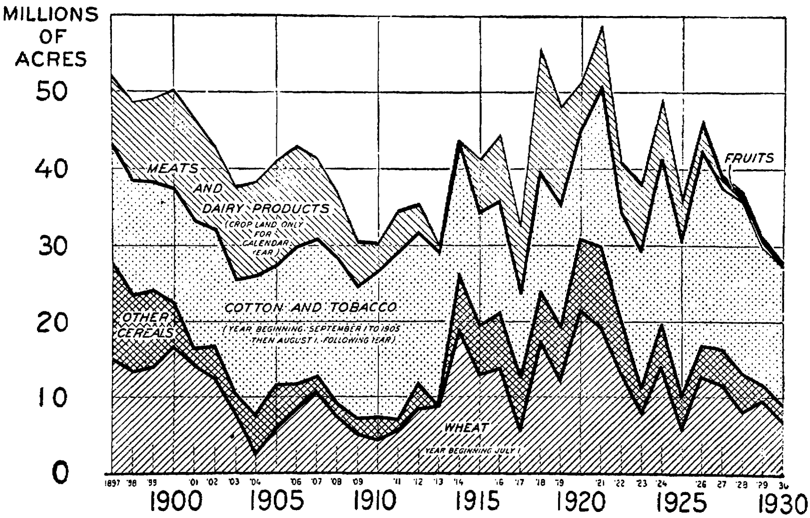

FIGURE 178.—Approximate acreage required to produce net exports of major farm products, 1897–1929. Exports of farm products, as well as number of births and of immigrants, have been trending downward during the last decade. In 1930 the acreage required to produce the agricultural exports was only a little over half that required in the years immediately following the World War, and was lower than at any time since the beginning of the twentieth century.

cline in European purchases the future alone can reveal. It appears unlikely in any case that exports will more than double in the next few years, and the outlook, therefore, is for an increase in demand for farm products varying more or less directly with the population of the United States.

Increase of Agricultural Production Per Acre

Since the World War agricultural production per acre has been increased in at least five ways:

(1) By the substitution of gasoline engines for horses and mules. The decline of about 8,400,000 horses and mules on farms, and of probably over 1,000,000 more in cities, between 1918 and 1931, has released nearly 30,000,000 acres of crop land, which has been used mostly to feed meat and milk animals and to produce cotton. This is equivalent to an increase of fully 10 per cent in the effective crop

acreage of the Nation (excludes land required to feed horses and mules).

(2) The increase in animal products (meat, milk, wool, etc., other than power) has been about 23 per cent, whereas crop feed available has increased not more than 10 per cent, while the feed from pasturage probably has declined slightly. This increased production of milk and meat per unit of feed consumed, assignable to culling of the cows, slaughter of cattle, sheep, and swine at an earlier age, reduction in death losses, particularly among hogs, a vast shift in pork production from the South to the Northwest, where the stock is better, and many other causes, has probably added the equivalent of 25,000,000 acres to the crop area.

(3) Less important, yet a significant factor, particularly from the standpoint of crop land requirements of the Nation, has been the

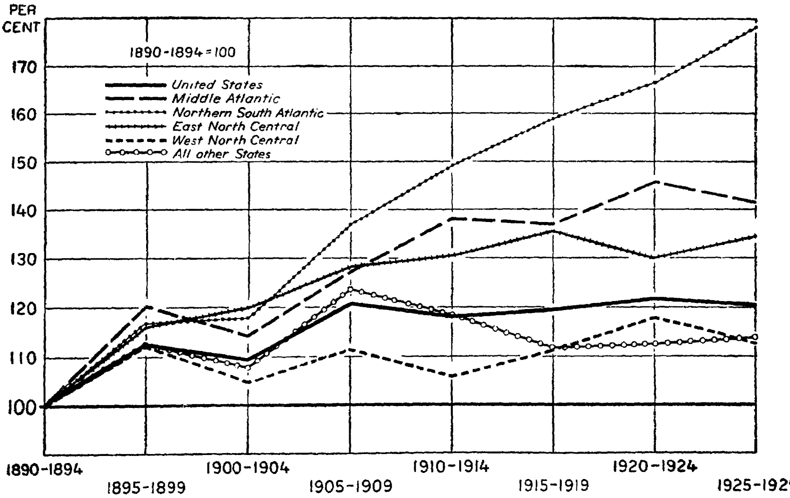

FIGURE 179.—Changes in composite yield per acre for corn, wheat, oats, and potatoes. The trend of acre yields of the crops taken as a whole and in the United States as a whole, has remained stationary for more than 20 years. But in sections of the United States where fertilizers have been extensively used, as in the northern South Atlantic States (North Carolina, Maryland, and Virginia) crop yields have increased greatly. When higher prices of farm products provide farmers with money to buy fertilizers, such increases in acre yields are likely to develop in other portions of the United States

shift from crops less productive per acre to crops more productive; notably in the South, from corn toward cotton, a crop which is worth much more per acre, from wheat toward corn in the North, and from grain and hay toward fruit and vegetables in several areas, notably in California.

(4) Likewise there has been a shift from beef cattle toward dairy cattle, hogs, and chickens, which produce much more food per unit of feed consumed than do beef cattle.

(5) Least important of the ways in which production per acre has been increased since the World War has been an increase in acre yields of a few crops. Totaling the important crops, including fruit, it appears that the average acre yield has remained about stationary since the World War. (Fig. 179.) Indeed, there has been a slight decline in the last three years, doubtless owing largely to adverse weather conditions

Nearly all the increase in agricultural production per acre, therefore, can be assigned to the decline in horses and mules and to improvements in animal husbandry. These two factors alone have added the equivalent of, roughly, 55,000,000 acres, to the effective crop area since the World War. This is an increase of about 18 per cent. It is principally these two new factors which have enabled the total crop acreage to remain almost stationary while agricultural production increased about 20 per cent.

Prospective Factors in Production

Will these factors that have increased production so greatly on a stationary crop acreage continue to operate even half so effectively during the next decade? And, looking beyond, will these factors provide food and fibers three decades hence for the 15 to 20 per cent increase in population without any increase in the crop acreage? These are questions no person can answer with assurance, but the following facts deserve consideration in reaching a conclusion:

(1) There are less than half enough colts on farms to replace the horses and mules that die yearly. Substitution of tractors and automobiles for horses and mules must continue, therefore, for several years at least. If a successful cotton picker should be introduced, the process, indeed, might be accelerated. The census for 1930 shows over 900,000 tractors on farms April 1 of that year, a greater increase between 1925 and 1930 than between 1920 and 1925.

(2) Culling of dairy cows continues, and undoubtedly can continue with advantage for many decades. Likewise sanitation in hog production and the raising of larger litters will doubtless continue. On the other hand, the gains in utilization of feed assignable to slaughter of cattle and sheep at an earlier age, are not likely to be so important in the future as in the past, for nearly all the slaughter now is of young animals. This factor of increasing efficiency in utilization of feed, therefore, is likely to diminish in importance.

(3) There is much less assurance of a continued shift from the crops less productive per acre toward those more productive per acre.

(4) There is no assurance of continued shift from classes of livestock less productive per unit of feed consumed toward the classes more productive per unit of feed consumed.

(5) Crop yields per acre, on the other hand, if the prices of farm products rise and enable farmers to buy fertilizers, should increase in the future. The possibilities inherent in the use of fertilizers, accompanied by abandonment of poorer fields, are illustrated by the upward trend of crop yields in the northern South Atlantic States (North Carolina, Virginia, Maryland, and Delaware) where the increase in average acre yield in the past 30 years has been about 50 per cent. (Fig. 179, top curve.)

Soil-Erosion Losses

One other factor deserves consideration, and that is the loss by soil erosion, notably in the South and Southwest. It is estimated by the Bureau of Chemistry and Soils that within 100 years gullying will be well advanced on 100,000,000 acres, unless effective measures of control become widespread. Something like 17,500,000 acres of land formerly cultivated in this country have been destroyed by gullying, or so severely washed that farmers can not afford to attempt their

cultivation or reclamation. Apparently, much of this destruction has occurred during the last decade.

Erosion appears likely, therefore, to reduce materially during the next decade or two the acreage in crops in many parts of the United States. Looking further into the future it appears inevitable that, unless eroding lands can be restored to pasture or forest, or other effective measures of control are promptly instituted, extensive land abandonment will occur in these areas of severe erosion, involving an increase in tax delinquency, slow impoverishment of the communities, with serious social consequences, and eventual extinction of agriculture in the localities. But the area of potentially arable land in the United States is so great that even the loss of most of the crop land now eroding badly, although of extreme importance locally, probably will not seriously affect the trend of agricultural production for the Nation as a whole. Between 1919 and 1929 over 32,000,000 acres of land, mostly east of the Mississippi River, went out of use for crops without any decrease occurring in the Nation's production because as many acres of former pasture land went into crops, largely in the Great Plains States. Indeed, production increased greatly in that decade, despite the stationary crop acreage, principally because of economies in land requirements resulting from the substitution of mechanical for animal power on farms and the more efficient use of feed by meat and milk animals. There are at present about 360,000,000 acres of land in harvested crops in the United States, but there remain probably 600,000,000 acres more that could be used for crops. Of this 600,000,000 acres about one-half, or 300,000,000 acres, require only to be plowed to be put into crops. Nearly all of this land is in farms.

The population prospect, in view of the advances in agricultural technic, leads to the conclusion that the total farm area of the Nation, and probably the crop area also, are not likely to increase much in the future, unless the immigration restrictions are relaxed or unless exports of farm products increase greatly, but that regional shifts in acreage are almost certain to continue. Much eroding land, much hilly land, much other poor land, will revert to forest, brush, or grass or will lie waste; while much level pasture land, principally in the Great Plains area, will be put into crops, and production per acre probably will increase in many parts of the United States on the more fertile, more level, or more favorably located land already in crops.

O. E. Baker, *Bureau of Agricultural Economics.*

NEED OF BETTER DIRECTED LAND SETTLEMENT SHOWN BY MISTAKES OF THE PAST

With approximately 600,000,000 acres of land physically capable of producing crops, but not now so employed, and with an economic need for a comparatively small increase in our net crop acreage the problem of giving direction to agricultural expansion on the basis of the use for which land can best be employed becomes increasingly important.

The agricultural land policy of the Federal Government has consisted in the past, and still consists, largely of making land easily available to the farmer, leaving him free to make his selection, finance the undertaking, and adjust himself to local conditions. Likewise,

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with few exceptions, the various States follow the policy of seconding the efforts of private land-selling agencies to attract prospective purchasers of land to the State and of leaving those attracted to the State in the hands of agencies having land for sale. In other words, the traditional public policy in this country has been to promote agricultural expansion without much, if any, regard to the use for which land was best suited, on the general assumption that practically all land which a settler might homestead or purchase was needed for farming purposes. There is now developing a recognition of the desirability of giving better direction to future agricultural expansion—of directing it to those areas having physical and other conditions conducive to the establishment of profitable farming enterprises. Such a program of action will materialize best as part of a more far-reaching program of land utilization.

Forces Behind Unwise Expansion

The economic history of agriculture has been marked by recurring cycles in which temporary price stimulus led to unwise expansion of farm acreage on lands physically unsuited for farming purposes and on lands with good physical characteristics not economically needed for agricultural use. Concrete evidences of such misdirected expansion are the financially embarrassed and defunct drainage, irrigation, levee, and other improvement enterprises and large numbers of abandoned farms in many parts of the country. The suffering of many communities because large areas of land have reverted to public ownership through nonpayment of taxes, and because numerous families are waging a hopeless battle against natural and economic disadvantages, are other results of overemphasis on the value of land for farming purposes. It is much easier and requires less stimulus to expand farm acreage than to contract it after homes have been established, farm buildings constructed, and time and labor expended in reclaiming land.

Practically all of the land physically capable of producing crops that is not now so employed is held for sale for farming purposes. A survey of the literature used by 1,258 active land-selling companies in the United States and of their practices revealed the fact that while some of these agencies are doing constructive work of a high character, many are operating in ways not in the public interest. On account of the pressure of carrying charges, many land owners are compelled either to allow their lands to revert to public ownership through tax delinquency or to push the sale of land regardless of its suitability for farming. From the point of view of the owner, to sell land under almost any conditions is better than to lose it through tax delinquency. Either a very small down payment or none is required by most agencies included in the survey. Many agencies also encourage prospective purchasers by promises of various types of grubstakes (lumber, one or more head of livestock, employment, etc.).

Almost half (46.7 per cent) of the 1,258 companies included in the survey are engaged in interstate business and slightly more than half of those engaged in interstate business are conducting so-called homeseeker's tours. The far-reaching nature of this interstate business is suggested by the fact that undeveloped and partly developed land in all parts of the United States is held for sale by the comparatively few agencies reached in the survey. (Fig. 180.)

The hunger for owning a farm, the high value many people attach to farm ownership, together with the relative ease of purchasing land, particularly undeveloped land; the general ignorance of prospective farm purchasers about obstacles which must be overcome in order to develop a profitable farming enterprise; and misjudgment or misstatement by various types of land-selling and promotional agencies regarding the physical and economic limitations of land for profitable farming, tend to promote agricultural expansion regardless of whether prices for farm crops are, comparatively, high or low.

In times of stress unemployed city families, particularly those who have had previous farming experience, look to the farm for a means of subsistence. Although there are no nation-wide organizations encouraging the movement of unemployed city workers to the country, there are at the present time committees in some cities endeavoring to

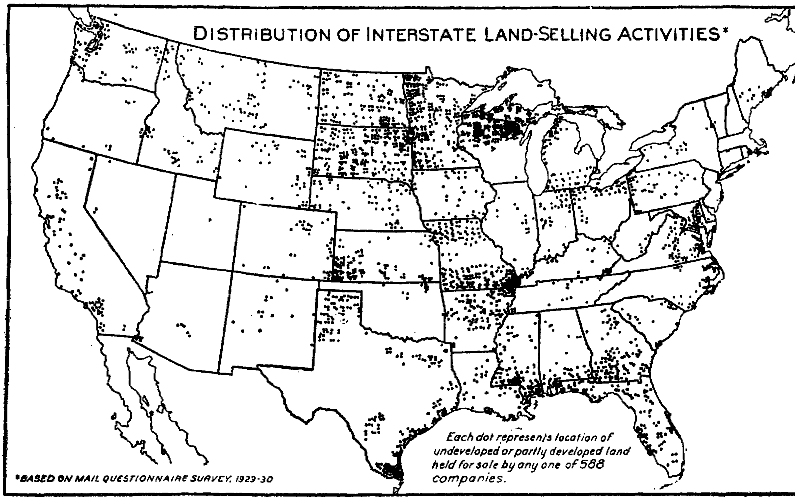

FIGURE 180.—Several land-selling companies endeavor to reach prospective purchasers of land in all but a few States. The majority of companies, however, restrict their activities to some special group of States. All classes of land are held for sale by these agencies, ranging from partly developed farms in what may be considered well-developed agricultural communities to cut-over or other undeveloped land remote from any agricultural development

help locate unemployed city workers on farms. A large number of jobless families have undoubtedly moved to the country as potential farm owners, regardless of the fact that well-established farmers are experiencing difficulty in maintaining a satisfactory standard of living. Without advice having a sound factual basis many of these new farm families are doomed from the start to failure. Undirected and misdirected settlement has in times past resulted in the loss of economic and human resources, and the chances for loss to-day are as great or greater than ever, because of the limited need for increasing our net crop acreage.

Agricultural Expansion Service Agency

No existing public or private agency has adequate information or necessary authority and facilities to furnish prospective farmers, land-selling agencies, various business interests, and other public agencies concerned with the farmer's welfare, sound advice on social and eco-

nomic justification for agricultural expansion in the different regions of the United States. There appears to be need for a service agency to supply unbiased information on the physical and economic adaptability of various classes of land for agricultural development, and thereby to reduce the loss of economic and human resources resulting from attempts to establish farms on lands submarginal for farming purposes. A coordination of the facilities and authority of Federal, State, and even county agencies would be desirable. A central agency of this character could help land-selling companies to develop sound programs for expanding the agricultural area when economically feasible. It could also list and certify developed and partly developed farms for sale or rent and in other ways could be of valuable service to present and prospective landowners, as well as to the public in general. With such an agency developing its program on the basis of careful analysis of the comparative advantages for agricultural development along one or more lines in the competing areas of the United States, many of the difficulties of giving better direction to agricultural expansion will have been overcome.

W. A. Hartman, *Bureau of Agricultural Economics.*

CROPS OCCUPY NEARLY HALF THE CULTIVABLE ACREAGE OF THE UNITED STATES

Of the estimated area of 973,000,000 acres physically capable of use for crops in the United States, 414,000,000 acres or approximately 43 per cent consisted of crop land (land in harvested crops and crop land lying idle or fallow) in 1930. The remaining arable land not used for crops is, on the whole, of lower natural productivity and utility than the crop land now in use. A part, however, is inherently much more productive than some land now used for crops, but in most instances of uncultivated fertile areas, the necessity of draining or clearing has hindered their development, and their inherent productivity may not at present justify the cost of bringing them into production. The marked diversity in quality of the uncultivated potential crop land and the prevalence of low-grade land with poor soil or hilly surface indicate the desirability of competent economic determination of the best use of the land before it is brought under cultivation.

Although the land now used for crops is, on the whole, of better grade than the arable lands not used for crops, considerable bodies of land now cultivated are of such poor quality that they apparently can not provide even a fair living to the operators. In some sections the attempt to farm such land has resulted from the failure to evaluate its capabilities before its development was attempted.

Nearly all the land physically suitable for growing crops is now in private ownership. The unreserved public domain contains little land of value for crop production, mainly because of aridity. Some of our uncultivated arable land consists of pasture or woodland on farms, while some consists of timberland or grazing-land holdings.

If the crop area were expanded to include all land on which crop production is possible, which is altogether unlikely, there would still remain close to 800,000,000 acres available for pasture, about 330,000,000 of which might be used for forest. In 1930 there were approximately 1,350,000,000 acres not used for crops, that could provide

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grazing of some sort, but a large part, probably more than four-fifths, was already used for grazing. Any large increase in the land used for pasture will be in the forested or cut-over area. Of the area of forest land of approximately 500,000,000 acres, it has been estimated that there are about 355,000,000 acres suitable only for forest. Under more intensive methods of forest management it is possible that our total requirements for forest products could be supplied from an area equal to that of the land suitable only for forest.

Small Need for More Crop Land

It is believed by those studying the trend of population and food requirements that little increase in the land used for crops will be needed for many years. (Fig. 181.)

The problems of land utilization are, therefore, less concerned with developing more land to use for crops, than with determining what lands it will be better to use for farming than for some other use under the economic conditions prevailing at any given time, and of coordinating the use of land resources so as to benefit the greatest number of individuals over the longest period of time. In some instances it may involve a change in the use of some land from crop production to some other major use, where the present use seems economically unsound.

The problems involved in the use of farm-land resources have various regional aspects, because of the regional distribution of such resources, and they require regional inventory of resources for intelligent solution.

The broad major rural land-use regions correspond to the great moisture belts. Thus, only in the humid regions does forest constitute an alternative major use. In a large part of the dry Southwest, grazing is the only use where irrigation water is not available. In the Great Plains and probably on the central prairies, crop land and pasture constitute the only feasible major alternative uses.

The humid and subhumid lands of the tall-grass prairies of the Central States are, on the whole, our most productive farm lands, having both favorable topography and naturally fertile soils. Together with the productive, originally timbered lands of the eastern Corn Belt, they are almost all in farms and are likely to remain so. A very large part of the farm area is in crops, and there can be relatively little increase in crop land without a change in the farm organization.

Problem in Areas of Low Rainfall

In the semiarid and subhumid short-grass plains, however, low rainfall reduces the productivity of inherently fertile soils. The moister lands with smooth surface, where large-scale methods can be used to produce crops at low cost, are very largely in farms, and these are mostly in crops. In the drier parts of this belt there are large areas of physically tillable land on which the yield is so unreliable that crop production is rarely profitable. In addition there are extensive areas in the Great Plains with surface so broken as to be essentially nontillable. Since the Great Plains are treeless, arable land there can be plowed without the cost of clearing. On the arid lands of the West, also treeless, rainfall is as a rule too slight for dry farming. Here,

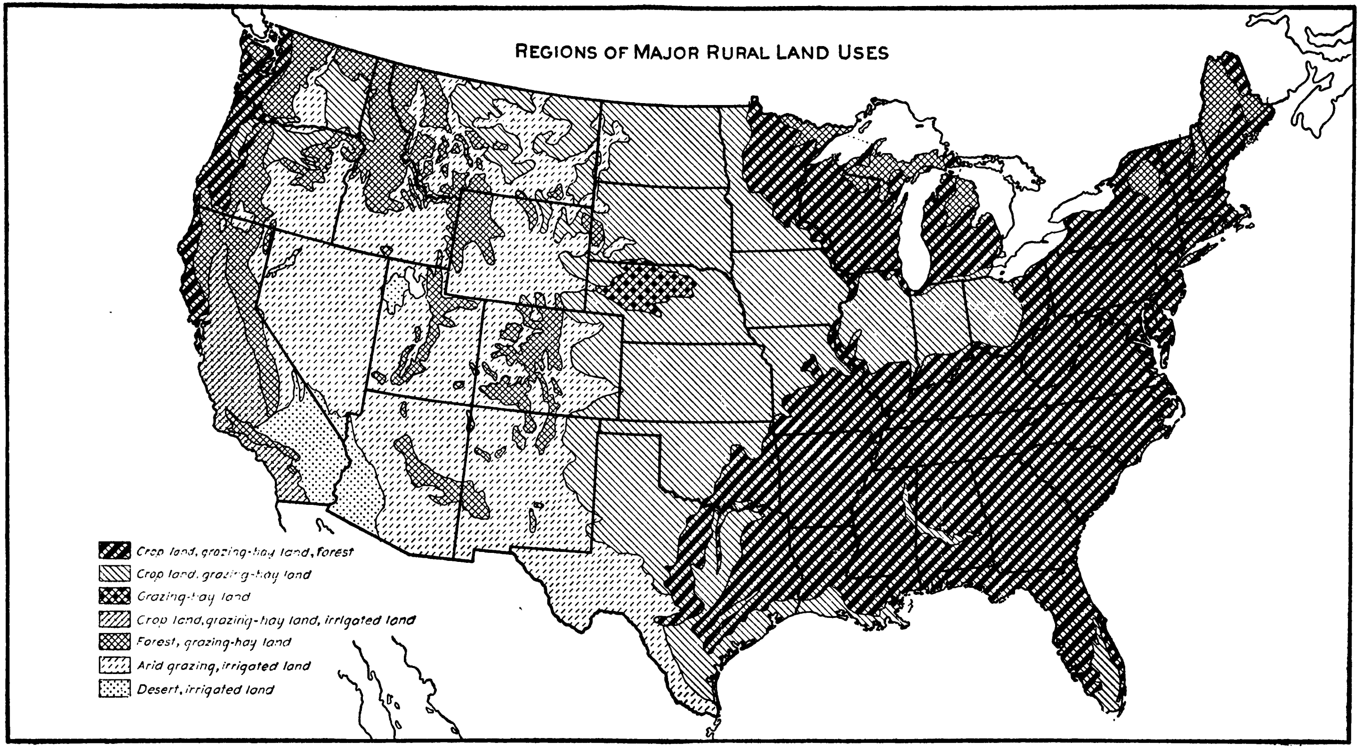

FIGURE 181.—Map showing locations in which different uses of land predominate

except for irrigable areas, the land finds its chief use in furnishing grazing for livestock. It is estimated that, in addition to the land now irrigated, there are 30,000,000 acres potentially irrigable in the arid part of the country. The cost of applying irrigation to most of this would undoubtedly be large, as the most easily irrigable lands have already been utilized.

The great humid forested regions contain large areas of land of various grades of natural productivity, physically capable of crop production. Included within the humid forest regions are a few natural grassland areas not now used for crops, of very favorable topography, but for the most part requiring drainage. Except for certain specialized crops these areas have soils of relatively low or doubtful productivity. Noteworthy among such lands are the great saw-grass swamps or Everglades and the poorly drained prairies or savannas of southern Florida. The uncultivated, poorly drained land with light-colored soils in the coast prairies of Texas and Louisiana are of moderate to low productivity when drained, although the poorly drained dark-colored lands of the coast prairies, much of which is used for extensive grazing, are inherently productive. (Fig. 182.)

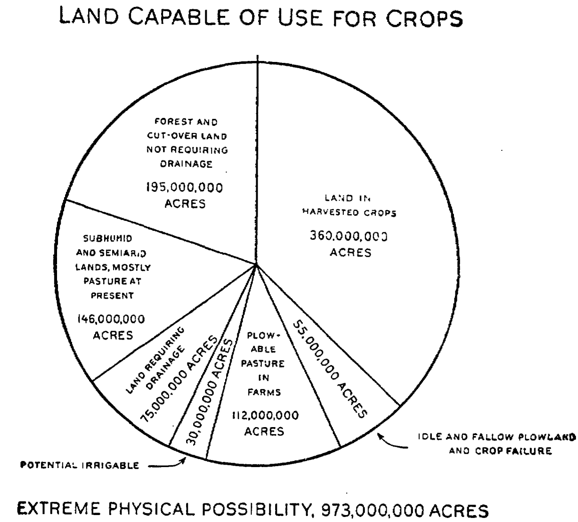

FIGURE 182.—Diagram showing proportion of land which is or can be used for crops, under different conditions

Atlantic and Gulf Coastal Plains

In the Atlantic and Gulf coastal plains are immense areas of forest land with level or gently rolling surface. In large part these are sandy lands. A considerable portion is poorly drained. Further drainage and clearing will be required before this land can be brought into production. Although some of these lands are undoubtedly as productive as a part of those now used for crops, the cost of reclamation and the relatively limited demand for the crops to which they are peculiarly adapted has deterred the clearing of large areas.

In the forested and cut-over country of the northern Lake States, there are large areas of favorable topography, part of which have relatively productive soils, still unused for crops. The short season and low temperatures here limit the range of crops that can successfully be produced. A part of these lands is deficient in drainage, and nearly all must be cleared. In the same region, and rather intimately associated with the more productive lands, are sandy and stony lands

of rather low natural productivity. In bringing new land into use, care must be exercised that the better lands be distinguished from the poorer and settlement guided accordingly. Inventory of soil resources is being carried on in the region to this end.

In northern Maine there are limited areas of productive soil at present densely forested. In the humid forested region of the Pacific Northwest are considerable areas of cultivable land now largely densely forested or covered with stumps, where costs of clearing are very high. Some of this land is moderately productive, while a part is hilly and a part is low in productivity.

Uncultivated Land in Humid Forest Region

Although the most productive lands in the humid forest region are, in general, used for crops, this region now contains the largest amount of uncultivated, potentially arable land, the quality of which ranges from high to very low. The wide range in quality necessitates careful discrimination in selecting lands for farming and indicates the desirability of land inventory and the economic classification of land. Particularly in the hilly and stony sections, considerable land is in farms and in cultivated crops, whereas its most advantageous use is probably something other than crop production. Gradual abandonment of such land and its reversion to forest have been taking place. It is probable that eventually there will be some substitution of the better grade lands not now used for crops, for the poorer lands now so used.

There is, further, some reduction in the area of productive farm lands taking place through loss of soil by erosion, both in the humid forest regions and in the subhumid and semiarid grasslands. Gradually a part of the land now in pasture or forest probably will be used to replace some of that land the productivity of which is reduced by erosion or depletion of fertility.

The problems involving the use of land resources are mainly those of wise selection; they require inventory, classification of land according to its most advantageous use, and intelligent planning.

C. P. Barnes *and* F. J. Marschner,
Bureau of Agricultural Economics.

AVERAGE VALUE PER ACRE OF FARM REAL ESTATE IN UNITED STATES WAS $48.52 IN 1930

The average value per acre of farm real estate on April 1, 1930, for the United States as a whole was reported by the Bureau of the Census to be $48.52. Considerable variation appears in different regions, as a result of varying combinations of physical and economic factors, and several more or less distinct groups of States may be distinguished. (Fig. 183.)

The States reporting the highest acre values are New Jersey, Connecticut, and Massachusetts. These high values reflect the effects of nearness to a concentrated market, and of an ever-expanding demand for locations for suburban homes by increasing numbers of city workers. A more extensive area, where values on the average are somewhat lower, although still appreciably above the United States average, embraces the fertile agricultural area commonly known as the Corn

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Belt, and also includes the several States bordering the Great Lakes. The farm lands in this area derive their value principally from their adaptability to agricultural production, although, it is true, certain sections border important industrial and commercial areas.

Farther to the west and southwest are the highly variable land areas of the Mountain and Pacific States. Values range from almost nominal amounts for the poorer-quality grazing lands to several thousands of dollars per acre for lands planted to subtropical fruits. In considering an area so heterogeneous it is easy to understand the high variability between the different State averages, which tend, on the whole, to be lower than the United States average because of the relatively large areas of low-priced land. California and Washington, however, are conspicuous for higher averages, by reason of considerable areas of high-priced lands.

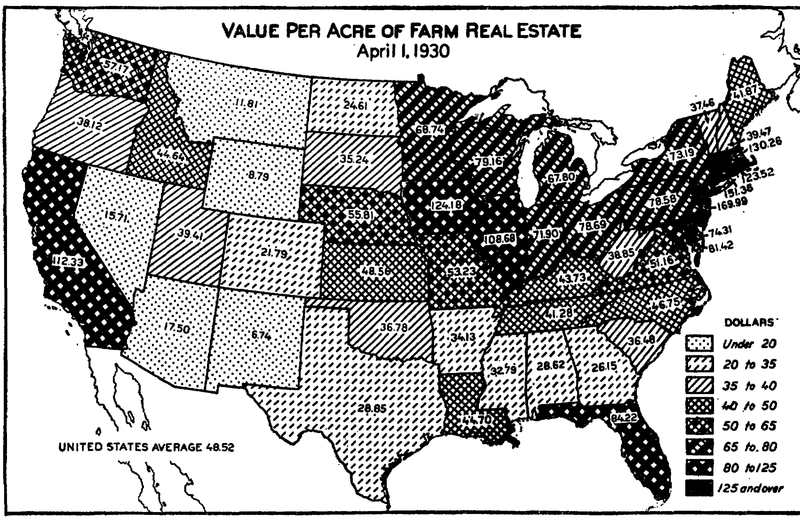

FIGURE 183.—Several generalized areas in the United States may be distinguished on the basis of average value per acre of farm real estate. A few States along the North Atlantic coast report high average values; the Corn Belt and States bordering the Great Lakes constitute a group in which average values, though somewhat lower in general, are appreciably higher than the United States average; the widely varying values in the Rocky Mountain and Pacific States provide many contrasts; and the cotton States bordering the Gulf of Mexico provide a group in which State average values reported are generally lower than the United States average

The States bordering the Gulf of Mexico, with their great dependence on cotton, average somewhat below the United States average, with the exception of Florida, where the combination of subtropical products and proximity to residential and recreational properties results in a rather high average.

The general relations described above mark the levels of land values in 1930, a decade after 1920, when farm lands for the country taken as a whole reached peak prices. The deflation in the last decade has been exceedingly varied in its effect upon farm real estate in the different agricultural areas. For the country as a whole, the per acre value of farm land and buildings was 30 per cent less in 1930 than in 1920, and by far the great majority of the States report farm real estate values much below those of 1920. Declines in value per acre of farm real estate in the Corn Belt and in the grain-growing areas to the Northwest

and Southwest were very severe. (Fig. 184.) The States in the Cotton Belt, with the exception of South Carolina and Georgia, reported smaller percentage decreases, and one State, Alabama, reported an increase. The Mountain States also reported declines, which, however, showed pronounced variation. Two Pacific Coast States reported declines less than the United States average and the third. California, reported a 7 per cent increase in average value.

Significance of New England Trend

In the New England and Middle Atlantic States the general trend in value of land and buildings as indicated by the State averages appears to have been upward. That this upward trend reflects a correspond-

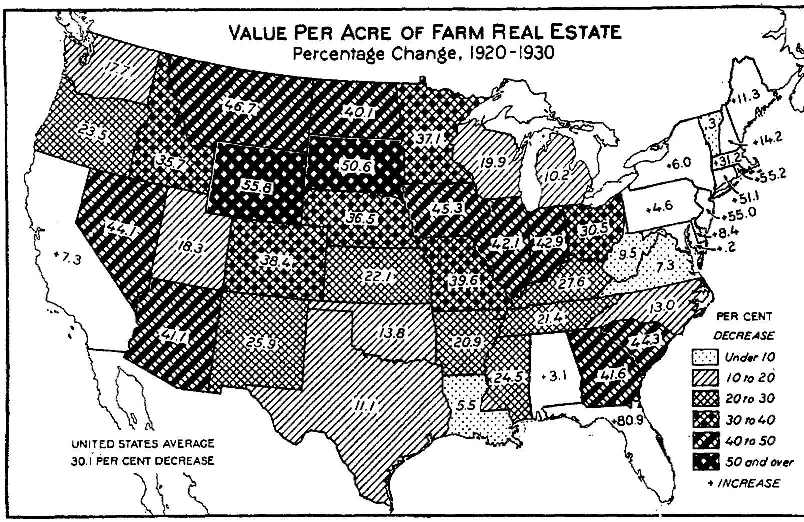

FIGURE 184.—For the United States as a whole, the average value per acre of farm real estate was 30 per cent lower in 1930 than in 1920. Regional changes in values have been far from uniform. The increases indicated by the State averages in several of the North Atlantic States are in contrast to the marked decreases throughout most of the Middle West, the Far West, and substantial portions of the South. State averages do not tell the whole story, however. In New York and Pennsylvania, for example, the greatest increases are, in general, in the eastern portions; many of the western counties in these States report decreases in value

ing degree of agricultural prosperity in these areas is doubtful, however. It appears more likely that the effects of encroaching suburban developments and recreational uses have resulted in an increased valuation in certain areas more than sufficient to counterbalance declining, or at least more slowly rising, values in some of the strictly agricultural portions of these States. Examples are found in the large increases reported in eastern and southeastern New York, as well as in eastern Pennsylvania and in New Jersey, in contrast to the declines reported in many of the counties in western New York and western Pennsylvania.

It is significant that the States reporting an increase in value per acre from 1920 to 1930 reported an aggregate increase in value of land and buildings amounting to $270,085,573 accompanied by a decrease of land in farms of 10,286,165 acres. The decrease of land in farms probably represents some degree of farm abandonment or the transition

to forest of part of the less valuable land, together with the absorption of other areas by expanding suburban districts and by various types of recreational usage, especially in parts of New England and New York. The States reporting decreased value per acre, on the other hand, reported an aggregate decrease in value of land and buildings of $18,707,816,160, and an increase in land in farms of 41,176,063 acres. The net decrease in value of farm land and buildings in the entire United States (excluding the District of Columbia) was $18,437,730,587.

Valuation of Buildings

It will be noted that the changes reported in value per acre of farm real estate relate to value of land and buildings combined. (Fig. 184.) That a considerable part of these increases in value per acre is due to

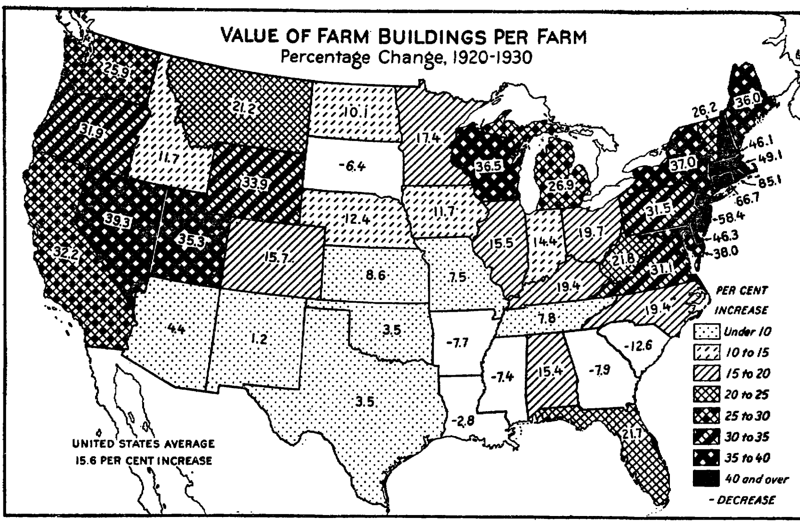

FIGURE 185.—That a substantial part of the reported increases in value per acre of farm real estate (land and buildings combined) is due to reported increases in value of buildings is indicated on the accompanying map. Several New England and Middle Atlantic States, where increases in value per acre appeared, report increases of 30 per cent or more in value of buildings per farm, in contrast not only to the smaller relative increases reported from many of the North Central and Southwestern States, but also to the decreases reported by several of the Southern States

increased value of buildings, rather than of land alone, is suggested in Figure 185, in which the percentage changes in value of farm buildings per farm from 1920 to 1930 are presented. The average increase for the United States as a whole is 15.6 per cent. The greatest percentage increases are found, in general, in the group of States with both the highest average value per acre of farm real estate, and with the greatest average percentage increases in value per acre during the decade 1920–1930, namely, the southern New England and Middle Atlantic States. Most of the Mid-Western States (Ohio to Kansas and North Dakota) report increases of less than 20 per cent, except Wisconsin and Michigan, where, it will be noticed, smaller percentage decreases in value per acre of land and buildings occurred than in the neighboring States. Several Southern States reported decreases in value of farm buildings per farm, notably Georgia and South Carolina, where, as indicated above, exceptionally large percentage decreases occurred in

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value per acre of farm real estate. Alabama, on the other hand, reported a 15 per cent increase in value of buildings per farm, as well as a 3 per cent increase in value per acre of farm real estate.

These trends apparently are related. There is reason to believe that some buildings were included in value of farm buildings, as reported by the 1930 census, that were not included in previous census enumerations. This situation may have arisen as a result of a new inquiry in the census schedule as to value of farmers' dwellings, plantation owners' homes presumably having been included in many cases in 1930, whereas they may previously have been omitted.

On the whole, the result of 10 years of readjustment has brought about a marked reduction in value of farm real estate in a preponderance of the typically agricultural areas. Generally speaking, however, farm realty values in New England, along the Atlantic coast (with a few exceptions), and through the cotton States are higher than in 1910; in parts of the Corn Belt and of the spring-wheat belt values are lower; while in the Mountain and Pacific States the situation is spotted. The extent of the declines from 1920 depends upon a variety of factors which center around the extent to which values in the various areas were inflated in 1920, and in the changes which have occurred in income from agriculture during the past decade.

B. R. STAUBER, *Bureau of Agricultural Economics.*

FARM DATA IN 1930 CENSUS

REGIONAL SHIFTS IN CROP ACREAGE SHOWN BY CENSUS HAVE BEEN EXTENSIVE

Despite the agricultural depression, the acreage of crops harvested in the United States as a whole increased materially between the years 1924 and 1929, but in 1931 most of the gain was lost. The census returns recently issued confirm the estimates of the United States Department of Agriculture that an increase of at least 9,000,000 acres occurred between 1924 and 1929; in fact, the census returns indicate an increase of nearly 15,000,000 acres. This discrepancy in figures probably is owing mostly to the fact that the 1925 Census of Agriculture was unaccompanied by a census of population and, therefore, may be less complete than the census of 1920 and that of 1930, which covered crop acreages of 1919 and 1929.

Crop land harvested in 1924 totaled 344,549,267 acres, according to the census, and 359,242,091 acres in 1929, which is an increase of 4 per cent. The crop acreage in 1929 had returned to the 1919 peak, and was, apparently, a little larger than ever before in the Nation's history. In 1930 the area of crops harvested increased another 2,000,000 acres, according to the estimates of the Department of Agriculture, but in 1931 a decrease of over 9,000,000 occurred—the greatest decrease on record, but almost confined to the Dakotas and Montana where severe drought occurred. Total acreage of crops harvested in 1931 was smaller than in any year since 1917, except 1924. It is significant that the total crop acreage of the Nation as a whole has remained more or less stationary for 15 years, despite an increase of 23,000,000 in population, or about 23 per cent. But this stationary national total is the result of great increases in acreage in certain portions of the Nation and of great decreases in other portions.

Regions of Decrease in Crop Land

The census statistics are tabulated by counties, and maps showing the decrease and increase in crop area between 1924 and 1929 reveal significant regional shifts in acreage. (Figs. 186 and 187.) The decrease in acreage of crops harvested has taken place mostly in a belt which includes nearly all of New England, every county in New York, every county in New Jersey except one, and in Pennsylvania, except three, all counties of eastern Ohio, and nearly all counties in the southern peninsula of Michigan; thence the decrease extends south-

westerly, including nearly every county in southern Indiana and in southern Illinois, also most counties of Missouri, all of southeastern Kansas and the northwestern half of Arkansas, practically all the eastern half of Oklahoma and most counties in central Texas. The decrease in the Chicago district really forms part of this 2,000-mile belt that extends from the Canadian border in Maine to the Mexican border in Texas.

Southeast of this belt less notable decreases in crop acreage occurred in most counties of Tennessee and South Carolina, also in about half the counties of Florida, Georgia, North Carolina, Virginia, West Virginia, and Kentucky and in more than half the counties of Maryland and Delaware. Georgia, South Carolina, Kentucky, and to a less extent all the Southern States, except Texas, suffered drastic declines in crop acreage during the previous 5-year period, 1919–1924, and a

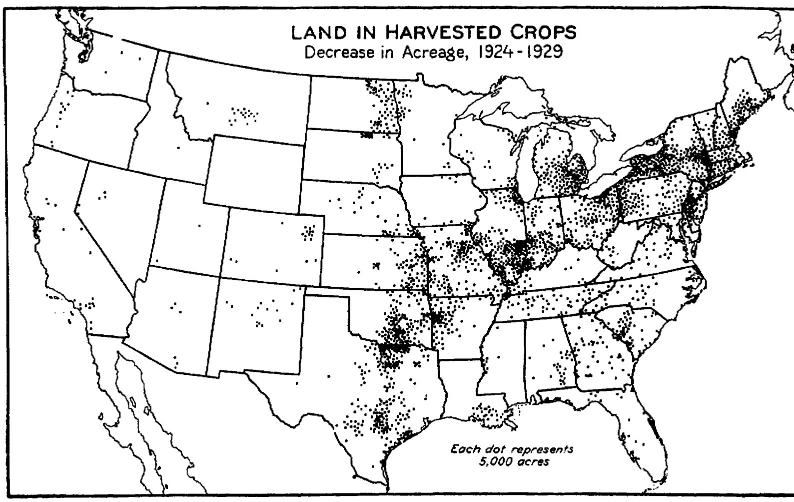

FIGURE 186.—The decrease of land in harvested crops between 1924 and 1929 occurred principally in a belt that extended from New England across New York and Pennsylvania, eastern Ohio and southern Michigan, southern Indiana and Illinois, to eastern Oklahoma and central Texas

recovery in some of the counties of this region was to be expected. (Fig. 188). In most of Indiana, Ohio, and southern Michigan, however, crop acreage also declined greatly between 1919 and 1924, and this decline has continued into the period 1924–1929. On the other hand, in New England and New York crop acreage declined little between 1919 and 1924 and in many counties increased. (Fig. 189.)

Minor areas of decrease in crop acreage between 1924 and 1929 are the "sugar bowl" of southeastern Louisiana, the eastern third of North Dakota and adjacent counties in northwestern Minnesota, the upper Yellowstone and Musselshell Valleys in Montana, western Oregon, and northern New Mexico. (Fig. 186.)

Regions of Increase in Crop Land

In nearly all other parts of the United States an increase in crop acreage occurred. (Fig. 187.) This increase was notable in the Great Plains area that extends from west-central Texas to the Canadian

border and beyond. Particularly heavy was the increase in the Panhandle of Texas and in the western parts of Oklahoma, Kansas, Nebraska, South Dakota, and North Dakota, also in northeastern

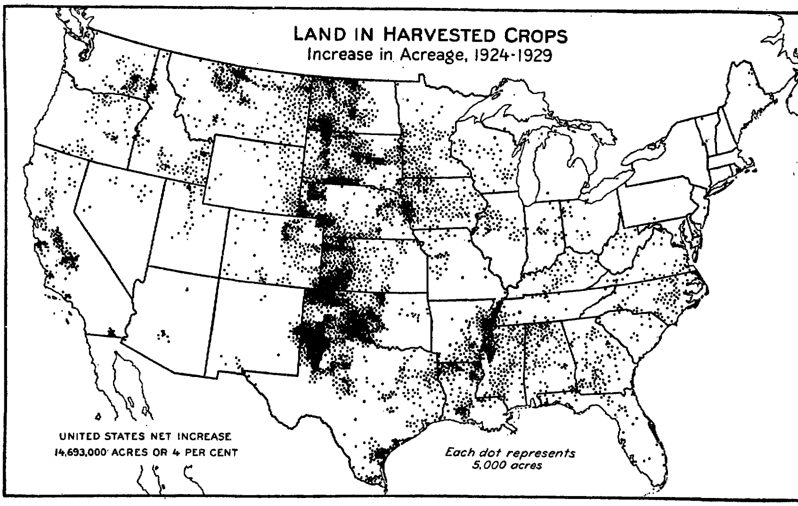

FIGURE 187.—The increase of land in harvested crops between 1924 and 1929, principally in the Great Plains area, Minnesota and Iowa, and in the Yazoo-Mississippi Delta, extending eastward into Alabama, exceeded the decrease in area by nearly 15,000,000 acres. (Fig. 186)

Montana and the Great Falls-Havre-Shelby triangle. This belt of increase, less heavy, extended eastward across Iowa and most of Minnesota into Wisconsin and central Illinois.

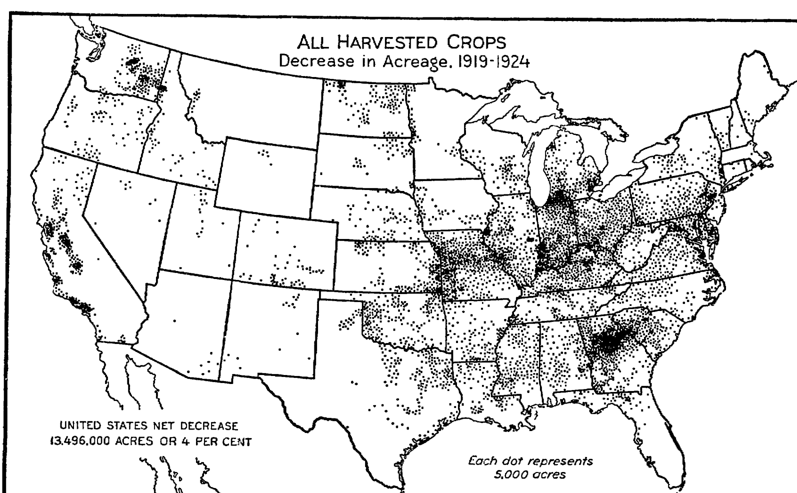

FIGURE 188.—In the period immediately following the World War, 1919–1924, the decrease in acreage of harvested crops was most notable in Kentucky, Ohio, Indiana, and southern Michigan, in central Missouri, and in the piedmont of Georgia and South Carolina. This decrease exceeded the increase, mostly in the Great Plains area, by about 13,500,000 acres

Smaller increases occurred in nearly all the counties from the Great Plains to the Pacific Ocean, except in northern New Mexico, western Oregon and several dominantly urban counties of California. Three

areas of increase in crop acreage in the East also deserve notice: (1) The Mississippi River bottom lands from Missouri southward to the sugar-growing parishes of Louisiana, and also the coastal-prairie rice district. Reaction from the decline in crop acreage after the World War appears to have spread from these Mississippi River bottoms eastward almost to Georgia and westward into eastern Texas. (2) The southern tip of Texas, notably around Corpus Christi. (3) The coastal plain of eastern North Carolina and southeastern Virginia. This increase is attributable, in part, to the fairly favorable prices for cotton prior to 1929.

In Figure 190 the decrease and increase in the decade 1919–1929 is shown by States. It will be noted that crop acreage decreased in every State east of the Mississippi River, except Mississippi, while in all the States west of that river crop acreage increased, except in

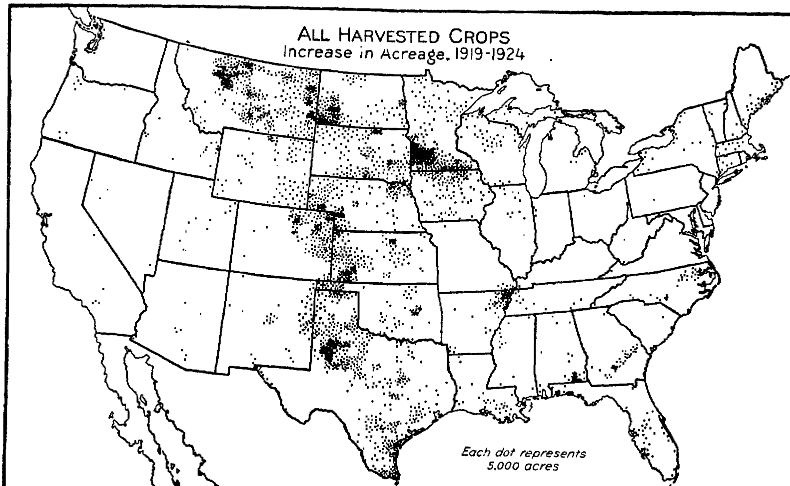

FIGURE 189.—The increase in acreage of harvested crops between 1919 and 1924 was almost confined to the Great Plains area, southern Minnesota and southern Texas, with a small area of recently drained land put into crops in southeastern Missouri and adjacent Arkansas

Missouri, Arkansas, and the three Pacific Coast States. When the decreases are tabulated for all the counties in which a decrease occurred, nearly all located in the originally forested portions of the United States, it appears that over 32,000,000 acres of land that were in crops harvested in 1919 lay idle in 1929, or were used for pasture, or were growing up to forest; while 33,000,000 acres, mostly in the originally grassland portions of the Nation, that were used largely for grazing in 1919, had been plowed and put into crops by 1929.

Conditions Associated With Changes in Crop Land

Viewing the United States as a whole, a few conditions appear to be associated with most of these notable decreases and increases in crop acreage. The decreases have occurred principally in areas:

(1) Where the soil was rather poor to begin with, or where sale of crops and animal products for many years without use of fertilizers has resulted in depletion of soil fertility, or where cultivation of sloping land has caused loss of fertility by erosion. Of these factors probably erosion is the most important.

(2) Where the surface of the land is too hilly or stony, or where the farms are too small to permit the efficient use of modern machinery.

(3) Where industrial or commercial opportunities in near-by cities have attracted the young people from the farms, or where suburban development has transformed farms into residential sites, golf courses, or idle land.

The large increase in crop acreage in the Great Plains area has occurred mostly in areas having—(1) fertile, virgin, grassland soils, unleached by heavy rainfall, and productive in seasons of normal and supernormal rainfall; also practically uninjured by erosion, owing largely to previous vegetation cover; (2) almost level land adapted to use of large-scale machinery; and (3) farms large enough to afford opportunities normally commensurate with those in the cities.

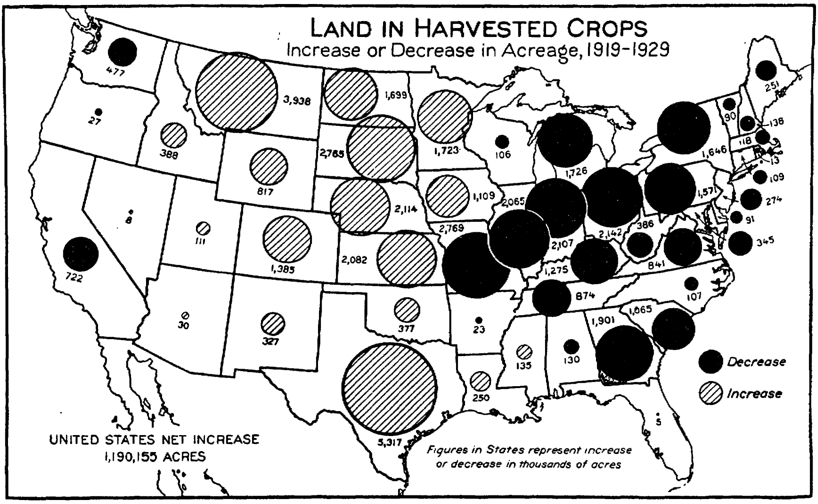

FIGURE 190.—Considering the regional changes in crop acreage for the decade 1919 to 1929 as a whole, and by States only, it appears that in every State east of the Mississippi River, except Mississippi, a decrease occurred; while in every State west of that river, except Missouri, Arkansas, and the Pacific Coast States, an increased occurred. The decrease was notable in the States extending from New York to Missouri, also in Georgia and South Carolina, while increase was equally notable in the Great Plains area, extending from Texas to Montana, also in Minnesota, and, to a lesser extent, in Iowa

Some of these factors also help to explain the increase in crop acreage in the Mississippi River bottoms and in many of the valleys of the 11 Western States.

It is evident that progress in the use of the tractor, the combine, and other large-scale machinery in the West has continued to promote expansion of crop acreage and this has continued to exert a depressing effect upon eastern agriculture. Since the census was taken this depression, owing to the great fall in prices of farm products, has extended in severe form into the West also, and it seems not unlikely that, if present unfavorable conditions continue, the expansion of crop acreage in the Great Plains and other western areas will slow up, possibly cease entirely, for a while. But contraction in acreage in the West, as in much of the East, will come slowly, if at all, because the farmer has the equipment and labor to operate the land, and taxes and interest payments have to be made.

O. E. BAKER, *Bureau of Agricultural Economics.*

REGIONAL SHIFTS LARGE IN MAJOR CROP ACREAGES DURING DECADE 1919–1929

The decade 1919 to 1929 witnessed a decline in crop acreage in the area lying east of the Mississippi River, which was more than offset by an increase west of that river. Much of the decline east of the river resulted from abandonment of farms or conversion of farm land to urban or semiurban use. A further cause of decline was the replacement of low-yielding acreages, particularly hay, by smaller acreages of higher-yielding crops or kinds of hay. Much of the increase west of the river resulted from the breaking up of new lands in the semihumid portions of the Great Plains States for cultivation under more modernized machine methods. A portion of the increase must also be attributed to the difference in the two crop seasons. In 1919, a severe drought over much of the western portion caused a heavy abandonment of crops. In 1929, on the other hand, a favorable growing season was accompanied by less than average abandonment. Certain regional changes in individual crop acreage result from readjustments of price levels. The year 1919 followed a year of very high prices for cash crops, while 1929 followed a year of relatively low prices.

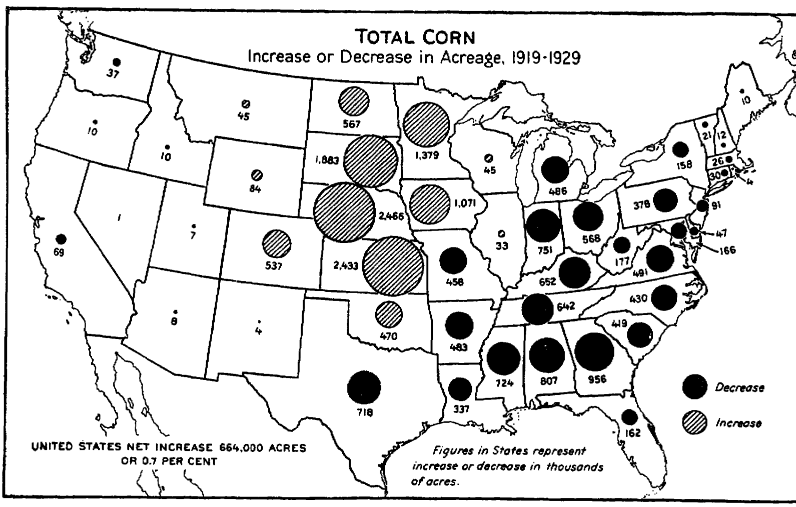

FIGURE 191.—Reductions in corn acreages east of the Mississippi River from 1919 to 1929 were slightly more than offset by increases west of the river, where corn and hogs, displaced much war-time wheat

The acreage of corn in the United States in 1929 was larger than the acreage in 1919 by about 664,000 acres, or 0.7 per cent. The exact change can not be determined, since in the census for 1929 acreage of corn for all purposes was enumerated, while in the census for 1919 the separate acreage of corn "for grain" and "for forage," and of all crops "for silage" and "for grazing" were enumerated. The extent of possible duplication can not be accurately determined. It can readily be seen from Figure 191, however, that a general decrease in acreage occurred east of the Mississippi River and in Missouri, Arkansas, Louisiana, and Texas. A very pronounced increase from Minnesota and North Dakota south to Kansas and Colorado took

place. The decline in corn acreage east of the Mississippi River was coincident with the general decline in crop acreages in this area. The expansion west of the river accompanied the expansion of the hog industry in that area, particularly in the more humid sections of these States, which are adapted to corn growing. In Iowa, the southern portion of Minnesota, and the eastern portions of South Dakota, Nebraska, and Kansas, wheat acreage was greatly expanded under war-time stimulus. Since 1919 corn and hogs have been more profitable under relative price conditions than has the growing of wheat. (Fig. 191.)

Wheat acreage in 1919 was still on a high plane brought about by war-time stimulus. By 1929 the acreage in the United States had decreased by over 11,000,000 acres. East of the Mississippi River and in Missouri, where total crop acreage declined, wheat acreage in addition returned to a normal proportion of the total crop acreage.

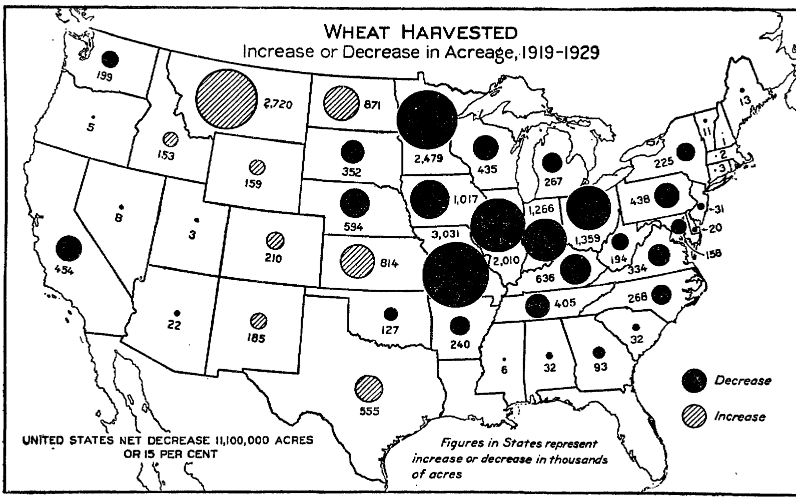

FIGURE 192.—Between 1919 and 1929 wheat acreage from Missouri eastward returned toward its normal proportion of the cropped acreage; from eastern Kansas northward it was partially displaced by corn and barley; and from western Texas and New Mexico northward, new lands were opened up for wheat growing

In Iowa and the southern portion of Minnesota and in the eastern portions of South Dakota, Nebraska, and Kansas, wheat acreage was displaced by corn, as mentioned in the preceding paragraph, and also by barley. In the western parts of the Dakotas, Nebraska, Oklahoma, and Kansas, and in the Mountain States from Montana to New Mexico, new land was broken up for wheat growing as a result of large-scale farming with tractors and combines. A part of the increase in North Dakota and Montana represents also a recovery from the extensive abandonment of wheat in 1919. (Fig. 192.)

The census data on cotton acreage show an increase of 9,500,000 acres or 28 per cent, from 1919 to 1929. Decreases shown in Georgia and South Carolina result from the precipitous decline in cotton acreage following three years of heavy loss from boll-weevil damage in 1921–1923. As a result of the short crops in these years, cotton was displaced in some parts by peanuts and other legumes, and in some parts farm land went out of cultivation entirely. In these States, acreage had not

returned to pre-weevil levels by 1929. In Alabama and parts of Mississippi, Louisiana, Arkansas, and Texas, acreages in 1919 were on a low level because of a series of weevil-damaged crops in 1916–1918. The increase to 1929 in this area represents a partial return to former acreage levels. In the Delta portions of Arkansas, Louisiana, and Mississippi, an upward trend in Delta cotton land has gone forward during the decade with new Delta land broken for cotton or diverted from corn and other crops. In Oklahoma and Texas the tremendous increase in acreage has come largely since 1924 in southwestern Oklahoma and northwestern Texas, where cotton is now produced on semihumid lands formerly in range and considered unproductive of this or any other cultivated crop. (Fig. 193.)

Oat acreage for grain declined over 4,000,000 acres or about 11 per cent, from 1919 to 1929. The decrease was rather general throughout

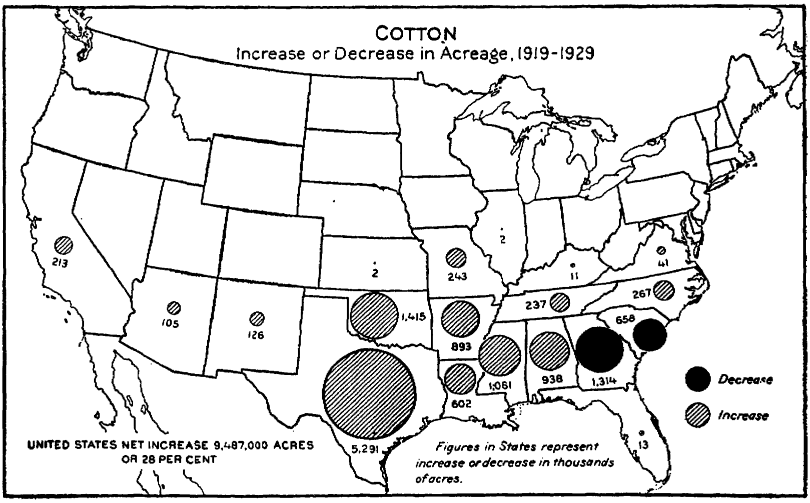

FIGURE 193.—Higher levels of cotton acreage now prevail in western Texas and Oklahoma where ranges were broken up, and in the Delta of the Mississippi River where high yields per acre are obtained. Lower levels prevail in Georgia and South Carolina where heavy weevil damage in 1921–1923 drove farmers out of cotton.

the country, except in Minnesota, Iowa, and Nebraska, where substantial increases were made. The decreased acreage reflects decreased work-stock numbers. In the Minnesota-Iowa-Nebraska area, oats are another feed crop increased with the increasing livestock industry in these States. A part of the decrease in acreage harvested for grain is offset by an increased use of oats as "bundle" feed and as a part of "mixed grain," the exact change in acreage of which is not determinable from census data.

Increase in Barley Acreage

Barley acreage in the United States increased over 6,000,000 acres or nearly 100 per cent, during the decade. The increase has been general except in the Northeast, and has been particularly marked from Illinois and Wisconsin westward to Idaho and southwestward to northwestern Texas and Colorado. Many States in this area doubled or even quadrupled the acreage of barley. The regional shift has been

away from wheat and oats and is another phase of the expansion of the hog industry westward from the Mississippi River.

The acreage of rye declined from a war-time peak of over 7,600,000 acres to 3,000,000 in 1929. The decrease was general, but was most marked in New York and Michigan where the reduction was over 80 per cent and in North Dakota where it was over 60 per cent.

The acreage of tame hay in the United States decreased from 55,600,000 to 54,300,000, or about 3 per cent. The decrease in acreage has been more than offset by shifts to higher-yielding kinds like alfalfa. The North Atlantic and Southern States, Ohio, and Indiana are producing less hay, while the States growing in importance in dairying, beef cattle, and sheep production, from Michigan west to Montana and southwestward to California are increasing hay production. Cultural difficulties in the production of alfalfa have led to a severe downward trend in hay acreage in Nebraska and Kansas.

The decrease in the acreage of wild hay during the decade, from 17,000,000 acres to 13,500,000 acres, reflects the breaking up of land in the Great Plains States for the growing of wheat, flax, and barley, and also the further draining of lowlands in a number of the North Central States.

JOSEPH A. BECKER, *Bureau of Agricultural Economics.*

FARMS FEWER BUT LARGER IN 1930 THAN IN 1920; CROP AREA PER FARM INCREASED

Changes in total numbers of farms reflect only to a minor extent the severe competition in farming that prevailed throughout the decade 1920–1930. There were 6,288,648 farms in 1930, according to the census, as compared with 6,448,343 farms in 1920. This is a decrease of less than 3 per cent. The amount of land in farms, 986,771,016 acres, in 1930 was approximately 31,000,000 acres more than the 1920 figure. The average size of farms increased to 157 acres in 1930 from 148 acres in 1920. Land in crops harvested averaged 57 acres per farm in 1929 and 56 acres in 1919.

Decreases in numbers of eastern farms were widespread partly because production per man is generally less in the East than on the larger, more level, and frequently more fertile farms of the West; also because of the relative nearness of eastern farms to urban centers of employment. (Fig. 194.) Indeed, the number of farms decreased in all States east of the Mississippi River, except North Carolina, Florida, Alabama, and Mississippi, but west of that river decreased only in Missouri, Montana, and Idaho. In all of the New England States, in New York, New Jersey, Pennsylvania, Ohio, Indiana, Michigan, Montana, South Carolina, and Georgia, numbers of farms decreased over 10 per cent between 1920 and 1930.

Decreases in numbers of Montana farms were sharp, following a number of years of drought so severe as to convince many newly settled farmers that they had been mistaken about the climate and the amount of land and capital required to farm in that State. Much of the land they left is now consolidated into larger farms so handled as to increase the production per man and to improve the competitive position of the remaining farmers.

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In extensive areas in South Carolina and Georgia, particularly in the lower piedmont of those States, boll-weevil damage and other factors made cotton farming very hazardous, and forced many farmers to seek a living elsewhere. Much of the land they left is no longer farmed. Many of the 228 counties of the United States in which numbers of farms decreased 25 per cent or more between 1920 and 1930 are in these two States. Montana and the New England States have many others, but only a few of these counties of large decrease are in the central part of the country. In three piedmont counties of Georgia there were less than half as many farms in 1930 as there were in 1920. Most of the other 16 counties with less than half as many farms in 1930 are near large cities or contain them.

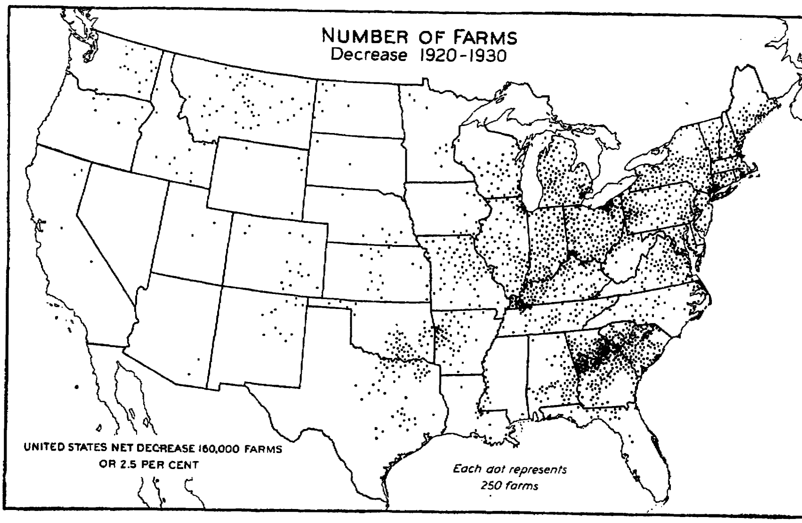

FIGURE 194.—The decrease in number of farms was notable in South Carolina, Georgia, and eastern Alabama, where much land went out of use for farming. A smaller decrease may be noted quite generally over the New England, Middle Atlantic, and East North Central States. There has been a trend toward consolidation of farms in the eastern Corn Belt and in the northern Plains. This trend was aided in Montana by several dry years which forced many recent homesteaders to leave their farms. The decrease in number of farms was greater than the increase, the net decrease for the United States being 160,000, or 2.5 per cent

The Western Cotton Area

Cotton production has been less hazardous and the morale of cotton farmers has been better maintained in the remaining cotton States, resulting in generally increased acreages of crops and in numbers of farmers. (Fig. 195.) The feasibility of cotton production in western Texas became widely appreciated, resulting in a phenomenal increase in numbers of farms there. South Texas, along with Florida and California, also gained greatly in numbers of farms as a result of the widened market for fresh fruits and vegetables. Of the 314 counties of the United States in which the number of farms in 1930 was greater than the number in 1920 by 25 per cent or more, 109 are Texas counties. Of the 45 counties in the country in which numbers of farms at least doubled, 34 are Texas counties.

Numbers of farms increased 10 per cent or more between 1920 and 1930 only in Arizona, Louisiana, California, Mississippi, and Texas, named in order of the percentage increase in each. Four of these five

States outranked all others in gains in numbers of farms. Between 1920 and 1930 Texas gained 59,456 farms, Mississippi 40,562, Louisiana 25,982, and California 18,006 farms.

Changes in Numbers of Farms by Size

Decreases in numbers of farms have been most general in a size group long regarded as somewhat ideal, farms of 100 to 174 acres, and increases in numbers have been most general in a size group long regarded as too small to provide a livelihood—farms of less than 3 acres. (Fig. 196.)

The number of farms under 3 acres more than doubled between 1920 and 1930, but even in 1930 these were less than 1 per cent of the total number of farms. Farms under 20 acres in size constituted 12 per cent of all farms in 1920 and 15 per cent of all farms in 1930. Farms on which cotton is grown are, in general, relatively small, and changes in cotton acreages have a marked effect on numbers of farms, particularly

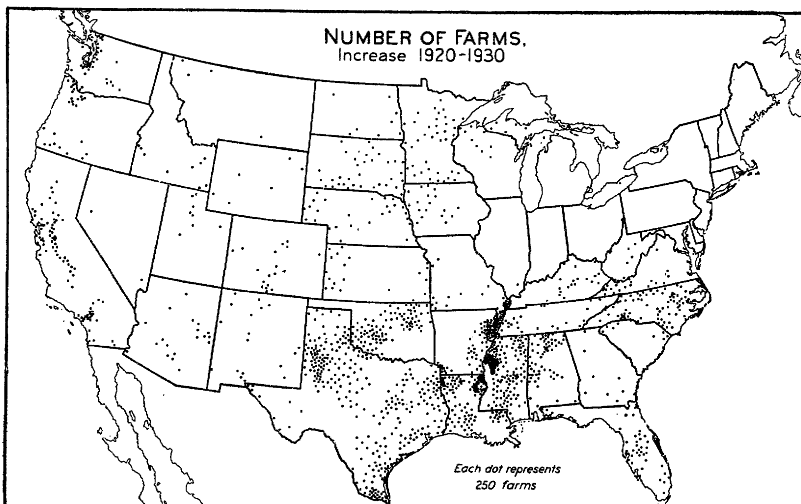

FIGURE 195.—The increase in number of farms between 1920 and 1930 occurred principally in the central and western portions of the Cotton Belt, in North Carolina, in central Florida, in Minnesota, and South Dakota, and in the valleys of the Pacific coast region

numbers of farms of the smaller sizes. The five cotton-growing States of Mississippi, Arkansas, Louisiana, Oklahoma, and Texas between them had about 83,000 more farms under 20 acres in size in 1930 than they had in 1920. The increase in numbers of farms of this size was about 120,000 for the country as a whole.

Changes in Five Size Groups

The great bulk of the farms of the country, 84 per cent in 1920, 81 per cent in 1930, are farms of between 20 and 500 acres. In all five size groups into which farms between these limits are divided by the census, the number of farms decreased in the country as a whole. However, in every size group, numbers of farms increased in some of the States. Farms of 20 to 49 acres, and farms of 50 to 99 acres, increased in number in most States in which the total acreage in farms increased, in some cotton-growing States in which total acreage in farms de-

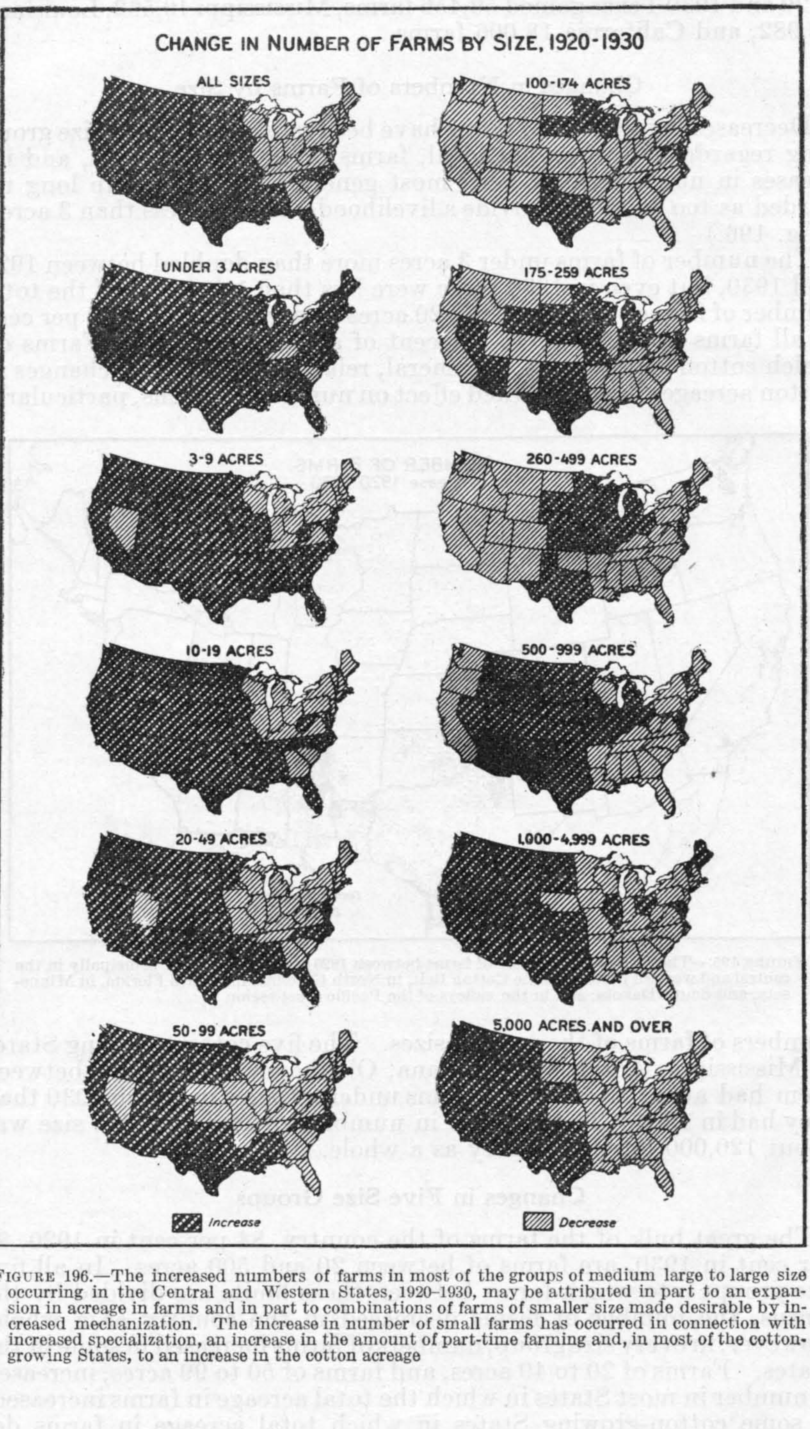

FIGURE 196.—The increased numbers of farms in most of the groups of medium large to large size occurring in the Central and Western States, 1920–1930, may be attributed in part to an expansion in acreage in farms and in part to combinations of farms of smaller size made desirable by increased mechanization. The increase in number of small farms has occurred in connection with increased specialization, an increase in the amount of part-time farming and, in most of the cotton-growing States, to an increase in the cotton acreage

creased, but nowhere else. Farms 100 to 174 acres in size increased in number only in Wisconsin, Minnesota, South Dakota, and Texas.

Numbers of farms in the size groups, 175 to 259 acres, 260 to 499 acres, 500 to 999 acres, 1,000 to 4,999 acres, and 5,000 acres and over, increased in at least half of the States, relatively few of which are east of the Mississippi River. In Delaware, Ohio, and Illinois, however, numbers of farms of 260 to 499 acres, 500 to 999 acres, and 1,000 to 4,999 acres, increased. In the Mountain States the expansion in total farm acreage occurring in each State and the acreage released as a result of decreased numbers of farms of 100 to 499 acres, was absorbed by the increased numbers of farms of less than 100 acres and of 500 acres and over. The situation was similar in all three Pacific States except that in them farms of 500 to 999 acres decreased in number also.

Because of the varying importance of farms of different sizes in different parts of the country, and because farms of every size increased in number in some States and decreased in other States, a statement of the degree of change in numbers of farms of any given size can have no great value, taking the country as a whole. With this caution it may be said that numbers of farms under 20 acres in size increased 15 per cent in the United States between 1920 and 1930 while farms of 20 to 49 acres decreased 4 per cent, farms of 50 to 99 acres decreased 7 per cent, farms of 100 to 174 acres decreased 7 per cent, farms of 175 to 259 acres decreased 2 per cent, farms of 260 to 499 acres decreased 5 per cent, farms of 500 to 999 acres increased 7 per cent, farms of 1,000 to 4,999 acres increased 19 per cent, and farms of 5,000 acres and over increased in number 26 per cent.

There is a general interest in large farms because of the increasing extent to which farming is being mechanized. In 1930 there were 9,299 farms of 5,000 acres and over as compared with 7,385 in 1920. These large farms increased in number only in the western half of the country, however, specifically in Nebraska, Oklahoma, Texas, and in the 11 States of the Mountain and Pacific divisions. These States include all but five States in which the total acreage in farms increased between 1920 and 1930.

Most of the largest farms are cattle ranches. Texas had 30 per cent of all the farms of 5,000 acres and over in 1930, Montana and New Mexico each had 10 per cent, California and Wyoming each had 8 per cent. Less than 3 per cent of the land area in farms of 5,000 acres and over was in harvested crops in 1929, as compared with 20 per cent in the farms of 1,000 to 4,999 acres, 27 per cent in the farms of 500 to 999 acres, and 48 per cent of the land area in farms of less than 500 acres. These large farms have not greatly affected the profits from crops grown on smaller farms. Of the total crop land harvested in 1929 in the United States less than 1 per cent was on farms of 5,000 acres and more as compared with 81 per cent harvested on farms of less than 500 acres.

Howard A. Turner, *Bureau of Agricultural Economics.*

FARM TENANCY INCREASED FROM 38.1 PER CENT OF ALL FARMS IN 1920 TO 42.4 PER CENT IN 1930

During the period 1920 to 1930 an unusual number of farmers in all sections of the United States changed their tenure relationship to the land. In spite of the low prices for farm products, some farmers have paid for farms and others have made substantial progress toward

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HOWARD A. TURNER, *Bureau of Agricultural Economics.*

FARM TENANCY INCREASED FROM 38.1 PER CENT OF ALL FARMS IN 1920 TO 42.4 PER CENT IN 1930

During the period 1920 to 1930 an unusual number of farmers in all sections of the United States changed their tenure relationship to the land. In spite of the low prices for farm products, some farmers have paid for farms and others have made substantial progress toward

ownership. Contrasted with these are many who were owners in 1920 but who are tenants now.

The net result of the changes in tenure of the individuals is a continuation of the trend toward more tenancy that has been in evidence since the first report on farm tenure by the census in 1880. The 1930 census shows that the increase in the percentage of tenant-operated farms for the period 1920 to 1930 was the second highest in the 50 years during which decennial statistics have been gathered. In 1930, 42.4 per cent of all farms were tenant operated. This represents an increase of 4.3 per cent in 10 years (from 38.1 in 1920), and of this increase 3.5 per cent was in the period 1925 to 1930. The largest previous increase was from 28.4 per cent in 1890 to 35.3 per cent in 1900.

There has also been an increase in the number and percentage of owner farmers who rent land from others. These are commonly referred to as part owners The percentage of part owners was 8.7 in 1920 and 10.4 in 1930. If the part owners and tenants are considered as one class, we find that more than half the farmers of the United States rent all or a part of the land they operate.

The percentage of tenant-operated farms varies greatly in different parts of the country. In Maine 4.5 per cent of all farmers are tenants and in Mississippi 72.2 per cent. The range in the percentage by counties is even greater than by States. (Fig. 197.)

Although the percentage of tenancy has increased in every decade since statistics were first gathered, this is the first time that the number of tenant-operated farms increased while the number of all farms decreased. There were about 160,000 fewer farms in the United States in 1930 than in 1920 and over 200,000 more tenants. It is of especial significance that this increase is composed mostly of croppers who do not even own work stock.

Changes in Six Groups of States

A fairly good general picture of regional changes can be obtained from a consideration of six groups of States.

The Northeastern States, which include New England, New York, Pennsylvania, and New Jersey, show a decrease in the number of tenants and in the percentage of farms operated by tenants. The number of tenants in almost all of the counties in these States showed a decrease of 25 or more. In only two counties did the increase in number of tenants exceed 25. Tenancy is relatively unimportant in these States, varying from 4.5 per cent in Maine to 15.9 per cent in Pennsylvania.

The decrease in tenancy in this section seems to be in part the result of decreased competition for farm land. The older owners find it difficult to rent their farms, hence continue to live on their land and carry on some farming with such help as can be found. Families from towns and cities who want to live on farms, using them for part-time employment, usually want to buy. Many of the owners who sell give good terms, thus enabling purchasers having little capital to buy, especially since the total value of a farm is generally low.

In all of the Southern States, which include Delaware, Maryland, West Virginia, Kentucky, Arkansas, Oklahoma, Texas, and all States south of these, tenancy increased, as measured both by numbers and percentage, except in Maryland and Delaware. The census of 1890 reported that each of the three divisions of the Southern States had approximately 38.6 per cent of its farms operated by tenants, and

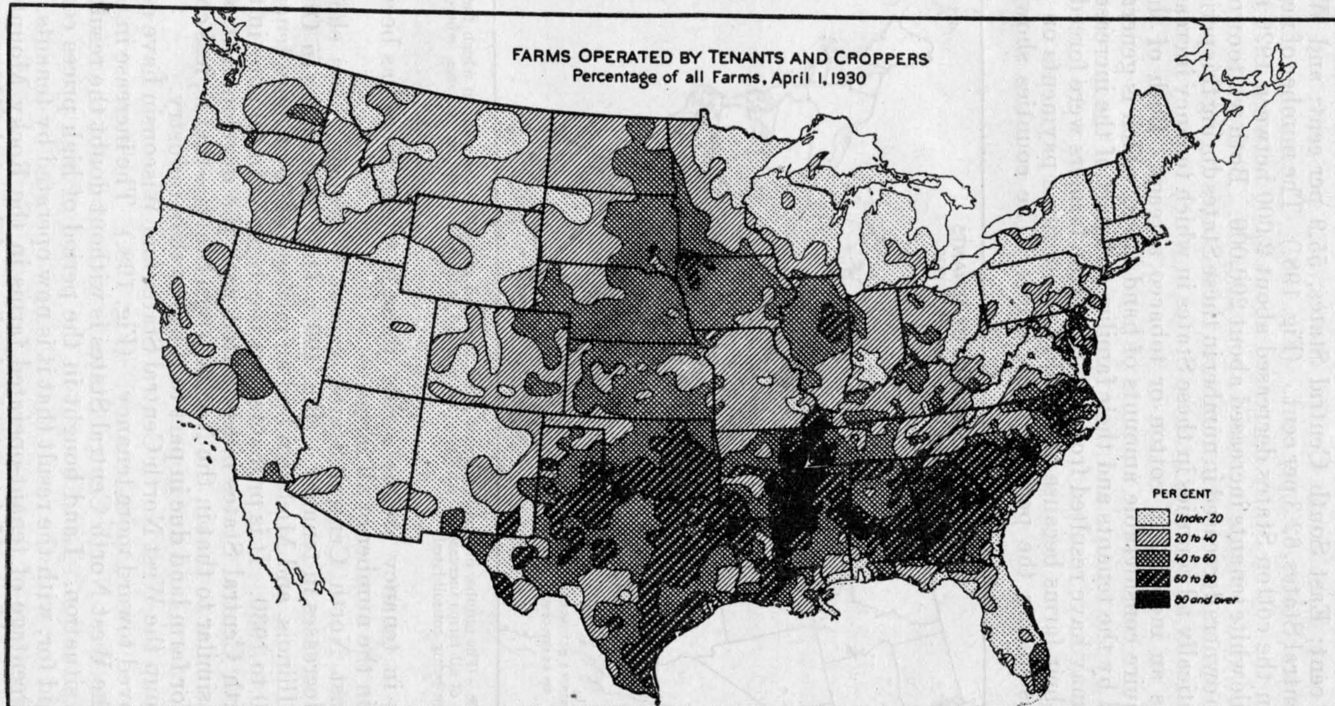

FIGURE 197.—The percentage of tenant-operated farms is highest in regions devoted to the cash crops—cotton, tobacco, corn, and wheat—mostly the Southern and Middle Western States. The percentage of tenant-operated farms is generally low in regions devoted to general and livestock farming, as in the northeastern portion of the country and in the Western States

each census since has shown an increase. The proportions of all farmers who were tenants in 1930 were as follows: South Atlantic States, 48.1 per cent; East South Central States, 55.9 per cent; and West South Central States, 62.3 per cent. (Fig. 198.) The number of negro tenants in the cotton States decreased about 2,000 between 1920 and 1930, while white tenants increased about 200,000. Both white owners and negro owners decreased in number in these States during this period.

In practically all counties in these States in which tenancy increased there was an increase in cotton or tobacco acreage. Both of these crops require considerable amounts of hand labor, which is generally furnished by the tenants and their families. A part of the increase in tenancy may have resulted from the fact some farmers were forced to give up their farms because of inability to continue payments on the mortgages during the period of low prices. The counties showing

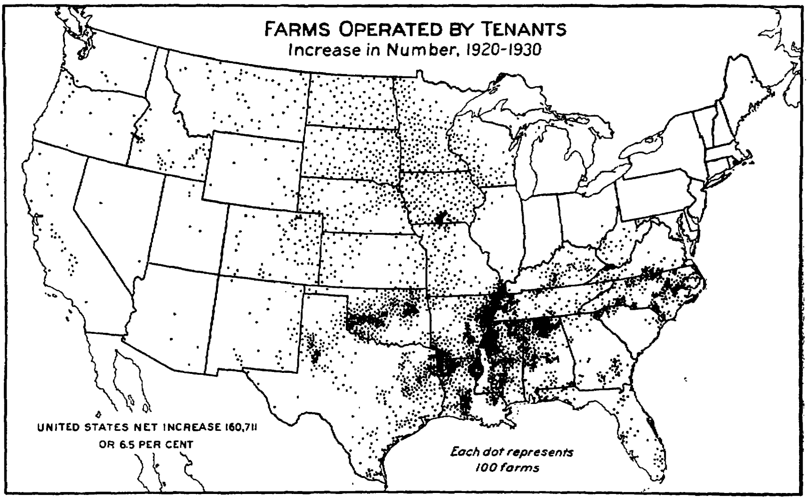

FIGURE 198.—The number of tenant-operated farms increased generally in sections in which the number of all farms increased. An exception is found in the wheat-growing sections, where farms are being consolidated

decreases in tenancy are, as a rule, those in which there has been a decrease in the number of all farms.

The East North Central States, except Wisconsin, have shown marked decreases in tenancy. (Fig. 199.) Only 23 counties in Ohio, Indiana, Illinois, and Michigan had an increase of 25 or more tenants from 1920 to 1930. It is probable that the decrease in tenancy in the East North Central States is associated with the development of a situation similar to that in the Northeastern States—that is, less competition for farm land due in part to the growth of industry.

As a group the West North Central States and Wisconsin have definitely moved toward more tenancy. (Fig. 198.) The increase in tenancy in the West North Central States is without doubt the result of the price situation. Land bought in the period of high prices could not be paid for, with the result that it is now operated by tenants.

The percentage of tenant-operated farms in the Rocky Mountain States increased from 15.4 to 24.4 in the decennial period 1920 to 1930. The number of tenants is not large in many of the counties in this division, but the increase was general. Of the 268 counties in these eight

States, 177 counties showed an increase of 25 or more tenants and only 3 showed a decrease of that number. The increase in tenancy in these States is the result of the low prices of farm products, and is similar to that which has taken place in the West North Central States.

The change in the percentage of tenant-operated farms in the Pacific Coast States has not shown a definite trend during the period for which data are available. The percentage of tenancy decreased in the three States taken as a whole from 20.1 to 17.7 per cent in the decade 1920 to 1930. Approximately one-third of the counties showed increases of 25 or more tenants, another one-third showed decreases of that number, and the remaining one-third of the counties showed very small changes. In all three States many counties have shown an increase in the number of owners of specialized farms devoted to fruit, poultry,

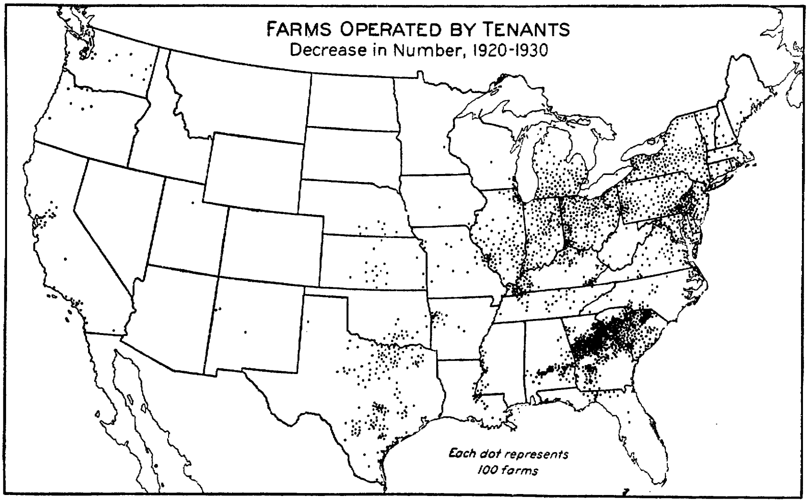

FIGURE 199.—The two areas showing greatest decrease in the number of tenant-operated farms are the northeastern and southeastern portions of the United States. Both also showed large decreases in the number of all farms

and dairy production, which enterprises are not well adapted to tenant operation, but there are counties in which the owners who bought land at high prices have lost their farms, thus increasing tenancy.

O. M. JOHNSON, *Bureau of Agricultural Economics.*

FARM POPULATION IN DECADE 1920–1930 SHOWS A CONSIDERABLE DECREASE

The outstanding change in the farm population within the decade 1920–1930 is a considerable decrease. In 1920 the farm population of the United States, as enumerated and reported by the Bureau of the Census, amounted to 31,614,269 and formed 29.9 per cent of the total population. In 1930 the Bureau of the Census reports the farm population to be 30,445,350, forming 24.8 per cent of the total population. The crude decrease between the 1920 and the 1930 enumerations is 1,168,919. The Bureau of the Census says:

The farm population as shown for 1930 comprises all persons living on farms, without regard to occupation. The farm-population figures for 1920 include, in

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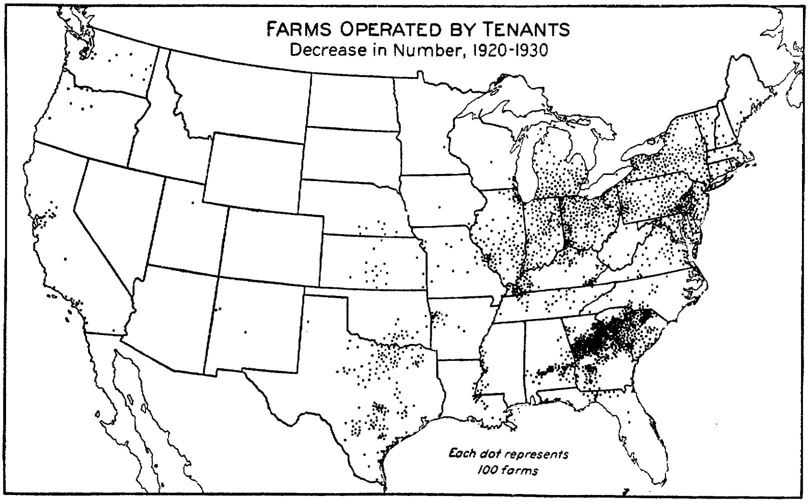

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addition, those farm laborers (and their families) who, while not living on farms, nevertheless lived in strictly rural territory outside the limits of any city or other incorporated place. Though the number of additional persons thus included is believed not to have been very great, some allowance should be made for this difference in definition when comparing the figures. Further allowances should be made for the fact that the 1920 census was taken in January, when considerable numbers of farm laborers and others usually living on farms were temporarily absent, while the 1930 census was taken in April, when by reason of the advancing season the number of persons on the farms was appreciably larger.

Seasonal Variation in Farm Population

The fact stated by the Bureau of the Census, that these two enumerations of the farm population are not wholly comparable, is important in understanding the changes recorded. The number of persons living on farms in the United States is doubtless fluctuating all through the year, from a low point in midwinter to a high point in spring and summer. There are many fluctuations and differences in States, due to the varying make-up of the farm populations, to the prevailing age of the farm operators, to differences in birth rates between sections of the United States and to the nature of the farm enterprises, which may require large temporary forces of laborers in some instances or a rather constant supply of laborers in others.

To make an enumeration in winter is to get a count of the permanent core of the agricultural people; to make it in the spring is to add to this permanent core a temporary increment from towns and cities of persons who consistently divide their occupational allegiance between town and farm. No one knows at present how large a temporary force the permanent farm population requires to carry on its spring and summer work. Undoubtedly in some of the States showing an increase in farm population in April, 1930, the increase is due almost entirely to this temporary increase of laborers. In late years it has also become a practice in some sections where the nature of the farm enterprise permits, for the farm family to leave the farm and go to town for the education of children or to travel. This temporary force, added to the farm population in the spring and summer, may reach a total for the United States of from 2,000,000 to 3,000,000 persons.

The significant fact of the decrease in farm population between 1920 and 1930, however, must not be overshadowed by the fact that these two enumerations are not entirely comparable. There have been several streams of influence which explain a gradual decrease of farm population in the United States.

Mobility of the American People

The great mobility of the American people is striking. Since 1870 the census has recorded the State in which each person was born; and the number of persons registered as living, decade to decade, in California, Iowa, Illinois, Missouri, New York, and other States, but born in Vermont, Virginia, Texas, Louisiana, and other States, is interesting and enlightening. This mobility has been an economic safety valve. Farming has not become an occupation so socially rigid that the farmer has been shut off from other economic opportunity. Undoubtedly this democracy of occupation and economic opportunity is an advantage to agriculture as well as to the Nation at large.

In 1790, 96.7 per cent of our population was "rural"—composed virtually of farm and village population. In the next 50 years, up to

1840, the rural population declined to 91.5 per cent of the total population; in the next 30 years (to 1870) it declined to 79.1 per cent. By 1880 it had declined to 71.4 per cent; by 1890, to 64.6 per cent; by 1900, to 60 per cent; by 1910, to 54.2 per cent; and by 1920, to 48.6 per cent.

Absolute Decreases by States

Inspection of the rural population by States shows that absolute decreases in numbers took place in Vermont and New York in each of the following decades: 1880 to 1890; 1890 to 1900; 1900 to 1910; 1910 to 1920. In Maine, New Hampshire, Ohio, and Illinois, absolute declines in numbers took place in three of the four decades noted above. Furthermore, in 18 States there was an absolute decline in numbers during the decade 1910 to 1920. The presumptive evidence is strong that if the farm population had been tabulated separately in the census during the decades before 1920, it would show not only a relative decline in percentage, but an absolute decline in numbers in the farm population in certain States from 1880 to 1920. Indeed, it is almost certain that the total farm population of the United States in absolute numbers declined from 1910 to 1920.

It must be evident that there is a reason for the main decline in numbers of farm people which has no explanation in the facts of war or postwar influences.

Three factors can not escape notice—factors which though related have not become simultaneously and equally effective in all States. These factors, moreover, while accounting for a decrease in farm population, make for agricultural prosperity. There is a conflict of forces at work, all tending to build up agriculture, but also tending to decrease the number of farm people to a point where the number is adjusted more perfectly to the agricultural task:

(1) There is the bodily transfer of several important agricultural processes from the farm to the town and city, in connection especially with grain, livestock, and milk; (2) the mechanization of many agricultural processes remaining on farms, especially in plowing, planting, harvesting crops, in feeding and care of animals, in dairy operations, and in automobile transportation; (3) and perhaps most important, the improvement through scientific methods of agricultural production, such as improved breeds of grains, vegetables, fruits, and animals, improved conditioning of soils, improved protection against plant and animal diseases.

It is difficult to imagine any other result of these three important forces operating upon American farming than the normal reduction of the necessary number of persons and families to produce the food and fiber for the Nation.

The agricultural depression of 1921 undoubtedly accentuated the long-time downward trend of farm population, but this fact should not blind us to the operation of the normal forces of adjustment which have long been operating in the interest of agriculture. We are not to expect a decline in farm population below the point of a number of persons adequate to carry on farm production for the needs of the Nation. Indeed, as population in the United States increases, we may see an upward adjustment to give adequate production.

C. J. Galpin, *Bureau of Agricultural Economics.*

WORKERS GAINFULLY EMPLOYED IN FARMING DECREASE IN RECENT YEARS

In the last 20 years there have been marked declines in the numbers of certain classes of agricultural workers, and in the proportion of the gainfully occupied population engaged in agriculture. According to the census the proportion of the gainfully employed persons engaged in agriculture was 32.9 per cent in 1910; 26.3 per cent in 1920; and 21.5 per cent in 1930. One hundred years ago over two-thirds of the persons gainfully employed were engaged in agriculture.

The census of 1910 was taken as of April 15, and that of 1930 as of April 1. Because the census of 1920 was taken as of January 1, its occupational statistics, especially as to agriculture, are not fully comparable to those of the other two censuses; consequently the 1920 statistics are not further considered here. Female workers also are not considered in the comparisons made, because statistics relating to them in the 1910 census are not fully comparable to those of 1930. The changes in total numbers of males engaged in agriculture, of wage-earning farm laborers, and of unpaid family laborers are to be considered principally.

The census of 1910 reported 10,583,212 males engaged in agriculture; that of 1930 enumerated 9,568,347. This indicated a decline of 1,014,865 persons, or 9.6 per cent. There were 2,642,070 male farm laborers "working out," and other wage workers in agriculture in 1910. They may be compared, roughly, with 2,555,935 farm laborers working for wages in 1930; and 2,133,949 farm laborers "working on home farm" in 1910 as compared, roughly, with 1,171,687 unpaid family workers in 1930. (See footnotes to Table 7.)

TABLE 7.—*Changes in number of males 10 years of age and over engaged in agriculture, between April 15, 1910, and April 1, 1930, by geographic divisions*

[Decrease indicated by minus sign (−); increase, by plus sign (+)]

Geographic division	Numerical change			Percentage change		
	Total	Paid [1] workers [3]	Unpaid family [2] workers [3]	Total	Paid [1] workers [3]	Unpaid family [2] workers [3]
	Number	*Number*	*Number*	*Per cent*	*Per cent*	*Per cent*
New England	−64,096	−12,648	−14,170	−23.7	−11.8	−60.5
Middle Atlantic	−204,215	−74,045	−56,479	−26.5	−25.2	−64.9
East North Central	−351,892	−60,734	−160,600	−19.9	−13.0	−58.9
West North Central	−103,916	+40,244	−154,639	−5.9	+10.9	−48.1
South Atlantic	−272,678	−27,754	−203,814	−14.0	−6.0	−40.7
East South Central	−200,069	−48,833	−177,287	−11.8	−17.0	−38.5
West South Central	−20,354	+4,421	−182,315	−1.2	+1.2	−44.2
Mountain	+77,632	+19,570	−892	+22.9	+14.7	−2.9
Pacific	+124,723	+73,644	−12,066	+33.2	+43.1	−45.9
United States	−1,014,865	−86,135	−962,262	−9.6	−3.3	−45.1

[1] The classes included are: In 1910—dairy-farm laborers; farm laborers (working out); gardeners; florists; garden, cranberry-bog, greenhouse, orchard, and nursery laborers; corn shellers, hay balers, and grain threshers; ditchers; poultry raisers and poultry-yard laborers; stock herders, drovers, and feeders; and other and not specified pursuits; in 1930—farm laborers, wage workers.

[2] The classes included are: In 1910—farm laborers, home farm; in 1930—farm laborers, unpaid family workers.

[3] There is some overlapping of classes, but the comparability of the data chosen seems not much affected. While some entrepreneurs and unpaid workers were enumerated by the census among the classes here included as paid workers, most of the people included in these classes appear to have been wage workers. It is known that some home-farm laborers receive wages. Unpublished data of this department indicate that of total time spent on farm work in a year about 4½ per cent is put in by paid members, and 23½ per cent by unpaid members of the farm operators' families. These figures apply to the United States as a whole. There are wide differences in the various States.

Between 1910 and 1930, all of the geographic divisions except the Rocky Mountain and Pacific lost in number of males engaged in their agriculture. The heaviest losses were in the Northeast. In these Northeastern States there occurred also the greatest decline in numbers of farms. The lowest losses were in the West Central States, where there were gains in numbers of farms. In all except two States east of the Mississippi, numbers of persons in agriculture decreased, the losses ranging from 2.3 to 35.1 per cent. In Wisconsin the number was practically stationary (0.1 per cent gain), while in Florida the gain was 25.8 per cent. In the 11 far Western States the 9.5 per cent loss in New Mexico was more than offset by gains elsewhere, running to 75.7 per cent in Arizona. California's gain of 57.5 per cent was numerically over half the net gain of the far Western States. The notable spread of intensive agriculture doubtless explains much of the gain in Florida, Arizona, and California. Changes in number of males engaged in agriculture are closely related to changes in numbers of farms and in type of farming, and to extension of use of labor-saving equipment.

Loss in Unpaid Family Workers

Most of the Nation's loss in male agricultural workers has been of unpaid family workers. This loss was about 962,000 persons, or 45 per cent. Each geographic division, and all except four of the Rocky Mountain States, reported such losses. As in the case of total males, the heaviest losses were in the Northeast, running to 74.1 per cent in New Hampshire. The loss was 68.6 per cent in Indiana and in Illinois. The lowest regional loss was 2.9 per cent in the Rocky Mountain States. This decline was numerically unimportant for the division, but there were sharp declines in some States nearly balancing sharp gains in others. Utah and New Mexico had the greatest losses, and Montana and Arizona the greatest gains in the division. The loss of unpaid family workers in California was large in percentage, but small in numbers, comparatively, because of the unusually high proportion of hired workers among the males in the State engaged in agriculture.

From 1910 to 1930 the United States lost 86,135, or 3.3 per cent, of its paid male agricultural laborers. Each geographic division east of the Mississippi River reported loss, while those to the west gained. In the East, the Middle Atlantic division had decidedly the highest loss, 25.2 per cent. Only two eastern States, Florida and Wisconsin, made large gains, 67.4 and 24.6 per cent, respectively. West of the Mississippi, Louisiana sustained a 33.1 per cent loss. California's gain of 66 per cent, or 73,506 such workers, was greater than that of any other three States, and practically all of that on the Pacific coast.

Male paid workers and male unpaid family workers on farms were not the only occupational classes to gain or lose. In addition, farm operators declined sharply in numbers east of the Mississippi River, and slightly in the West North Central States. In the South Central and far Western States the number of farm operators increased, especially in the West South Central and the Pacific States.

Because agriculture is fundamental to the production of the food supply of the Nation, the decline in numbers of farm workers may at first seem startling. But this result has been brought about by a steady increase in production per worker fully sufficient to meet the agricultural needs of the Nation.

JOSIAH C. FOLSOM, *Bureau of Agricultural Economics.*

HOW TO USE FARM CREDIT

TOTAL INDEBTEDNESS OF UNITED STATES FARMERS ESTIMATED AT 13 TO 14 BILLIONS

Economic developments since 1920 emphasize clearly the importance of a conservative use of credit in the production program of the farmer. Although it is impossible to avoid a large part of the distress and financial embarrassment resulting from such a drastic price decline as has occurred in recent years, many present difficulties are due directly to the careless use of credit. Others are due to the lack of credit in the proper amount and at the proper time.

The types of credit employed in agriculture fall mainly into four classifications: Real estate mortgage credit, short-term loans, intermediate-term loans, and merchant credit. A fifth group, marketing credit, might be included; but inasmuch as it is more frequently negotiated by others than farmers and is obtained largely from financial institutions in the larger centers, it may be logically included in short-term commercial bank credit.

Of the various types of agricultural credit, farm real estate loans are the most important from the standpoint of volume. The total farm-mortgage indebtedness materially exceeds $9,000,000,000, notwithstanding a slight reduction in the last two or three years, partly as the result of amortization of principal, but primarily through an increased volume of foreclosures.

The short-term indebtedness of farmers is represented chiefly by loans from local banks in agricultural areas. In 1923, loans of this character were estimated at slightly less than $3,000,000,000. This amount has since been somewhat reduced by the large number of bank suspensions and through the policy of country banks in making investments outside their communities an increasing proportion of their total assets.

Satisfactory estimates of the amount of intermediate-term loans owed by farmers are not available. A large proportion of the loans of this type is included in the total credit advanced to agriculture by country banks. Additional amounts have been advanced by livestock-loan companies and by farm-implement companies. On September 30, 1931, rediscounts of the Federal intermediate-credit banks totaled $81,000,000. This amount, however, also includes short-term loans for crop production.

Data on the amount of outstanding merchant credit are likewise meager and unsatisfactory. The annual volume of such credit has been estimated to exceed $1,000,000,000. Other short-term obligations of farmers, owed largely to individuals, and for which no estimate is available, doubtless also amount to a substantial sum.

HOW TO USE FARM CREDIT

TOTAL INDEBTEDNESS OF UNITED STATES FARMERS ESTIMATED AT 13 TO 14 BILLIONS

Economic developments since 1920 emphasize clearly the importance of a conservative use of credit in the production program of the farmer. Although it is impossible to avoid a large part of the distress and financial embarrassment resulting from such a drastic price decline as has occurred in recent years, many present difficulties are due directly to the careless use of credit. Others are due to the lack of credit in the proper amount and at the proper time.

The types of credit employed in agriculture fall mainly into four classifications: Real estate mortgage credit, short-term loans, intermediate-term loans, and merchant credit. A fifth group, marketing credit, might be included; but inasmuch as it is more frequently negotiated by others than farmers and is obtained largely from financial institutions in the larger centers, it may be logically included in short-term commercial bank credit.

Of the various types of agricultural credit, farm real estate loans are the most important from the standpoint of volume. The total farm-mortgage indebtedness materially exceeds $9,000,000,000, notwithstanding a slight reduction in the last two or three years, partly as the result of amortization of principal, but primarily through an increased volume of foreclosures.

The short-term indebtedness of farmers is represented chiefly by loans from local banks in agricultural areas. In 1923, loans of this character were estimated at slightly less than $3,000,000,000. This amount has since been somewhat reduced by the large number of bank suspensions and through the policy of country banks in making investments outside their communities an increasing proportion of their total assets.

Satisfactory estimates of the amount of intermediate-term loans owed by farmers are not available. A large proportion of the loans of this type is included in the total credit advanced to agriculture by country banks. Additional amounts have been advanced by livestock-loan companies and by farm-implement companies. On September 30, 1931, rediscounts of the Federal intermediate-credit banks totaled $81,000,000. This amount, however, also includes short-term loans for crop production.

Data on the amount of outstanding merchant credit are likewise meager and unsatisfactory. The annual volume of such credit has been estimated to exceed $1,000,000,000. Other short-term obligations of farmers, owed largely to individuals, and for which no estimate is available, doubtless also amount to a substantial sum.

Shift in Credit Sources Since 1920

Since 1920, there has been a marked shift in the sources supplying credit to farmers. The collapse of the war-time inflation boom occurred at a time when farmers generally were heavily indebted to local banks and to local dealers for supplies and equipment. In the period immediately following, a large part of this short-term indebtedness was funded into long-term real estate loans. The volume of farm-mortgage indebtedness which was estimated at $7,857,700,000 in 1920 increased to a total of $9,360,620,000 in 1925, and in 1928 it was placed at $9,468,526,000. In 1930, the total indebtedness showed a slight decline to $9,241,390,000. The sources of these loans in 1928, classified according to the principal groups of lenders, were as shown in Table 8.

TABLE 8.—*Sources of loans to farmers in 1928*

Lending agency	Amount		Lending agency	Amount	
	Million dollars	*Per cent*		*Million dollars*	*Per cent*
Federal land banks	1, 146	12. 1	Active farmers	339	3. 6
Joint-stock land banks	667	7. 0	Other individuals	1, 453	15. 4
Commercial banks	1, 020	10. 8	Other agencies	685	7. 2
Mortgage companies	988	10. 4			
Insurance companies	2, 164	22. 9	Total	9, 468	100. 0
Retired farmers	1, 006	10. 6			

Since 1920, the Federal and joint-stock land banks have assumed an increasing importance as a source of farm mortgage credit. Loans from individuals and banks, however, have decreased in both relative and absolute importance. Life-insurance companies have risen to the leading place in financing farm-mortgage credit requirements.

The present lack of local credit facilities in many localities, occasioned by numerous failures of country banks, has led to an increased interest in the organization of agricultural-credit corporations and similar institutions utilizing the rediscount facilities of the Federal intermediate-credit banks. The expansion of this type of credit, however, has been relatively slow. In April, 1931, there were 330 credit corporations and livestock-loan companies using Federal intermediate-credit bank facilities. These corporations had a total unimpaired capital, surplus, and undivided profits, of $21,825,000.

Considerable assistance has been supplied by the Federal Government in meeting the most pressing credit requirements of farmers in areas seriously affected by the drought or other climatic adversities. Since 1921, seven annual appropriations, totaling $83,750,000, have been made by Congress for loans directly to farmers, chiefly for the purpose of purchasing seed, feed, and fertilizer. In 1931, total appropriations for these emergency purposes totaled $67,000,000 and loans were made in 32 States.

In all, the total indebtedness of farmers for all purposes may be roughly estimated at $13,000,000,000 to $14,000,000,000. The annual interest charge on this indebtedness may be assumed to average about 6 per cent on the real estate indebtedness, 8 per cent on the short-term indebtedness, and between 15 and 20 per cent on merchant credit, making an annual carrying charge approximating $900,000,000. Much of this interest burden might well have been avoided by a more conservative use of credit. Excessive reliance on credit, however, is

by no means a universal trait of farmers. As a class they have smaller credit obligations in proportion to their assets than have most other economic groups. Many farmers avoid resorting to credit even when it could be used to decided advantage.

NORMAN J. WALL, *Bureau of Agricultural Economics.*

MERCHANT CREDIT IMPORTANT IN FARM FINANCE, BUT MAY HELP OR HARM THE FARMER

Older than any of the forms of cash borrowing is the use of credit in purchasing goods. The seller, usually a merchant or dealer, becomes a source of credit by permitting payment at a later date. No conclusive figures are available for the annual amount of farm credit extended by merchants and dealers in the United States but it probably exceeds $1,000,000,000.

Such credit used by farmers varies materially among the different sections of the country. It is relatively more important in the South than in the North and West, and its use varies with the amount of purchased materials or equipment necessary to produce the year's crop or other farm products.

The purposes of merchant credit naturally conform to the demands of the type of farming served. Dairy feeds in the North Atlantic States, fertilizer in the South, and machinery and equipment in the West are particularly important items frequently purchased on time. Although the most widespread use of merchant credit is probably for the purchase of household supplies and hardware, there is a tendency for this type of credit to be concentrated on the items requiring large expenditure. In 1931 manufacturers estimated that one-third of all fertilizer used in the South was purchased on credit. On the Eastern Shore of Virginia where early potatoes are the main cash crop and fertilizer the largest single item of supply expense, approximately 85 per cent of the fertilizer used for this crop in 1928, 1929, and 1930 was sold to farmers on time.

The agencies which extend merchant credit to the farmer include the local storekeeper; the local dealer in machinery, feed, or other supplies; seed and fertilizer companies; and local and central marketing agencies. Oftentimes the local agencies in turn receive a large share of their financing in the form of merchant credit extended by wholesale houses and other central agencies. In the case of the Virginia potato area, about 50 per cent of the fertilizer was sold on time to the supply dealers by fertilizer companies.

Sometimes a Major Form of Credit

At times in certain localities merchant credit has become a major form of credit, because of emergencies arising out of bank failures, crop failures, or poor prices. In such cases merchant credit has been of great service to the farmer notwithstanding its relatively high cost. Because it is the most direct, it is often the most convenient means of borrowing. Even for those to whom bank credit is available it cares for many small items for which payment in cash can not be made readily because borrowing at the bank is done in larger sums.

Arrayed against these advantages, however, are other considerations which tend to make merchant credit a wasteful and dangerous

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form of financing. The cost generally is higher than for other credit, the cost burden is inequitably distributed, and the ease of credit accommodation favors overspending.

The cost is greater because of greater risk and a more lax security policy. Frequently the actual cost is concealed. Very generally, goods sold to farmers on time bear a higher price than when sold for cash. This difference in time prices and cash prices often is so large as to constitute a rather startling interest cost when expressed as a per annum rate. The facts that a part or all of the credit cost is so generally in the form of an increase in price, and that such credit usually runs for varying periods, make difficult the computation of the actual rate of cost. The pronounced differences in the cost of merchant credit and credit from cash-lending institutions as found in studies made in Southern States, are indicated in the following Table 9.

TABLE 9.—*Costs of merchant credit and cash credit in five Southern States expressed as rates per annum*

State	Year	Merchant credit	Cash credit
		Per cent	*Per cent*
North Carolina	1926	25.0	7.7
Georgia	1926	26.3	11.5
South Carolina	1926	31.6	9.6
Arkansas	1926	17.7	8.7
Oklahoma	1925–26	34.8	11.4

The Factor of Risk

In much of the merchant credit, added risk arises from the financing of a more hazardous type of enterprise as well as from lower financial responsibility of many of its users. The preferred part of the community's credit demand will ordinarily be met by cash-lending institutions operating under interest-rate restrictions. The less substantial borrowers that tend to rely upon dealers for credit find accommodation only upon such terms as will permit the absorption of losses from unpaid accounts. Those who pay their bills also pay heavy losses chargeable to those who do not. These losses often offset the greater part of the credit charge as shown by a tabulation (Table 10) of merchants' reports obtained in credit surveys in North Carolina and South Carolina.

TABLE 10.—*Charges and losses on merchant credit in North Carolina and South Carolina, expressed as rates per annum*

State	Charges	Losses	Gain
	Per cent	*Per cent*	*Per cent*
North Carolina	23.3	13.9	9.4
South Carolina	35.0	14.6	20.4

The allowance for loss which the time merchant finds necessary in view of the character of his trade as a whole, represents a serious waste for the community and imposes a severe penalty on the debt-paying farmer. In some localities prices of goods sold on credit may not be higher than the prices for cash purchases at the same store. Prices in

such stores, however, commonly are somewhat higher than those in stores selling on a strictly cash basis. The loss from unpaid accounts in this case is distributed among all the customers rather than among only those who use credit. The convenience which store credit offers may easily result in a habit of overspending. This is doubly disadvantageous because of the additional cost involved in the higher credit price on the goods.

Change Would Have Broad Advantages

The farmer who uses merchant credit from habit rather than from necessity can improve his position by getting out of that class of borrowers. Graduation into the class that uses bank credit instead of merchant credit often requires changes in the type and methods of farming as well as in the financial practices. Less reliance on a single crop, a production plan requiring fewer purchases, or a larger farm unit may be necessary. A record for reasonable efficiency in production and some unencumbered assets saved and accumulated from earlier years, are usually required from applicants for bank credit. Only by energetic striving for these qualifications, if they are not already possessed, can the present users of merchant credit hope to escape from the waste and expense generally associated with it. The more general substitution of cash credit from conservative and specialized credit agencies for the present more haphazard merchant credit, will in the long run benefit not only the farmers and the bankers but the merchants as well.

David L. Wickens *and* Burton D. Seeley,
Bureau of Agricultural Economics.

INTERMEDIATE CREDIT FACILITIES CAPABLE OF SUBSTANTIAL EXPANSION

Loans for the purposes of improving, stocking, or equipping the farm can not, as a rule, be repaid within the period usually allowed on short-term production credit. They may require a term of two or three years, but do not call for the very long term usually needed in the case of farm mortgages. Such loans have come to be known as intermediate credit. Loans to provide farm buildings and machinery, tiling or fencing, work stock, dairy or beef cattle to diversify production, are quite likely to require an intermediate term.

On many farms the reorganization of the production program to obtain a better and fuller use of the land and of the labor time of the farm operator and his helpers, may bring an appreciable increase in the annual net returns. With better equipment it may be possible to care for the field work of certain additional crops without any increase in labor. On many farms, additional livestock can be profitably used as a means of marketing surplus feed supplies. In the so-called 1-crop regions, a considerable reduction in the "out-of-pocket" expenses can be obtained by producing a larger proportion of the food and feed supplies needed on the farm. In order to accomplish this, it is frequently necessary, however, to increase the investment in livestock, in housing, in fencing, and in other farm and soil improvements.

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The farmer should first appraise carefully the increase in his net annual returns that may be expected from his proposed investments. Farmers occasionally buy expensive equipment which accomplishes a material saving in labor time, but at a season when the released labor can not be profitably employed in other productive enterprises. In such instances, the investment in the machine merely results in increasing overhead costs without increasing farm returns. Unless the individual farmer already has a current income well above his current obligations, expenditures of the type which facilitate farm operations but do not increase the net income should be entered into with extreme care. The thoughtless borrower otherwise may be forced to sacrifice some of his personal property in order to meet payments on intermediate obligations.

Partial-Payment Plan

It is highly desirable that repayment of loans for these purposes be made on the partial-payment plan. In such case, the principal should be reduced as rapidly as possible in order to lessen the risk of price fluctuations. This risk increases, of course, with the length of the loan period. The crop yield on a given farm may at times vary even more than the price of farm products. With uncertainties in both price and yield, all years of favorable income should be taken advantage of to retire as much of the obligation as is consistently possible.

For the different classes of livestock more or less definite price cycles have hitherto occurred, making them sometimes high and at other times low in relation to the general price level. Borrowing to expand operations in a given class of livestock when prices are relatively high involves not only the risk of a disappointing income from the livestock as prices decline, but also involves a reduction in the value of the underlying security. This decline in inventory value may cause the forced liquidation of the loan by sale of the security. Years of favorable prices give opportunity for producers to reduce their credit obligations to a minimum, thus accumulating a reserve borrowing power which can be used in expanding operations when prices have reached a lower level.

The country bank has been the chief source of intermediate credit, loans being obtained for short periods and frequently renewed. This short-term renewal plan has the disadvantage that the bank may find it necessary to require prompt payment if credit conditions become unfavorable. Often renewals of this type of loan are willingly granted when farm returns are favorable, and under such conditions the borrower frequently accepts the renewal and expands his operations on the basis of his increased income. In years of unfavorable farm income, on the other hand, the bank may require the maximum liquidation. The result is too often a pyramiding of credit in good years and a severe contraction in years of reduced income and prices.

Loans by Implement and Livestock Companies

A considerable volume of intermediate credit has been extended by farm-implement companies and livestock-loan companies. Such credit from the former is often costly and is usually extended to facilitate sales with little regard to its advantage to the farmer. Livestock-loan companies of the older type performed a valuable

service, but loans from these agencies were confined chiefly to larger growers and feeders.

In 1923 the Federal Government established 12 Federal intermediate-credit banks to provide farmers with credit of an intermediate term. These banks do not make direct loans to individual farmers. They discount farmers' notes for banks and other credit agencies, and are authorized to make direct loans to farmers' cooperative associations.

Several hundred agricultural-credit corporations have been organized to obtain credit for farmers by using the discount facilities of the Federal intermediate-credit banks. The term of loans and discounts by these banks is limited to a maximum period of three years, and in practice has rarely exceeded one year. Renewals, however, are granted when circumstances justify, and these banks, which draw their loanable funds from the central money markets through the sale of debentures, are more likely to be in position to grant renewals than are many commercial banks that rely upon deposits.

Management by the Banks

The 12 Federal intermediate-credit banks are managed by the same directors and officers that manage the Federal land banks, each Federal land-bank board having charge also of one intermediate-credit bank. All these banks, as well as the joint-stock land banks, operate under the supervision of the Federal Farm Loan Board in Washington, D. C.

The Federal intermediate-credit banks have as yet supplied only a small part of the intermediate credit needed by farmers. They have, nevertheless, been of real assistance to farmers' cooperative marketing associations and to many local credit institutions and their farmer clients, in areas where this new source of credit has been used. Their loan and discount operations are capable of a very substantial expansion.

In most communities there has been a lack of local credit agencies that were willing and able to use the discount facilities of these banks. The recent action of the Federal Farm Loan Board in allowing the local bank or credit corporation a somewhat wider spread between the discount rate and the rate charged the borrower may be expected to increase the use of these discount facilities to the benefit of the farmer in need of credit. This should be particularly true of farmers who have in mind well-considered farm improvements and programs that require credit for an intermediate term.

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SHORT-TERM CREDIT IS BEST RESTRICTED TO PRODUCTIVE USES

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Although opinion may be divided as to the rigidity with which this rule should be applied, few persons will deny the wisdom of its warning. It is a common weakness to desire comforts and luxuries that are beyond one's means. For this reason it is hard to deny oneself when credit is easily obtained. If comforts or luxuries are limited to those which can be purchased with funds actually possessed, the worst that can happen is failure to accumulate savings. When they are purchased with credit, however, the result is likely to be a burden of indebtedness which will become progressively more difficult to carry. Limiting borrowing to the necessaries of production is one of the surest methods of avoiding extravagant expenditure and of accumulating a reserve for future needs.

If the spirit of the rule is borne in mind, the term "productive purposes" may be liberally interpreted. Borrowing to pay taxes, necessary living expenses, and interest on mortgage indebtedness may be sound uses of bank credit, if the amount of such borrowing is kept well within the farmer's current income-producing power. Frequently, expenses of this character have to be met at a time when it is disadvantageous to dispose of crops or livestock. In such cases, it is most profitable to meet those needs by borrowing, and to mature or hold products until they may be sold to better advantage. Unforeseen emergencies may necessitate borrowing for purposes that would not ordinarily be classed as productive.

Under some circumstances, it may even be desirable to borrow for vacations, automobiles, or radios. But these are border-line cases and may easily be carried to excess. The spirit of the rule is to keep expenditures well below income so that each year one's accumulation of savings will be increased.

The Bankers' Problem

Unwise loans not only are a detriment to the borrower but they also are likely to impair the services of banks. Each year many farmers of a community need financial assistance in growing and marketing their products. Banks have a fund of deposits from which they make advances for these purposes. Once the funds are loaned, however, future advances depend upon the repayment of advances made in the past. Loans made to finance the operations of one season must be paid if the banks are to have funds for financing the next season's operations. When borrowers fail to pay their notes, they impair their own borrowing positions and reduce the ability of banks to finance local productive operations. Furthermore, excessive loans frequently cause banks as well as farmers to become hopelessly insolvent.

When borrowing seems advisable, or becomes necessary, farmers should attempt to obtain loans that will not mature before there is a reasonable chance of paying them. It is a widely prevailing practice among bankers to date notes at 60, 90, or 180 days with the tacit understanding that they will be renewed at maturity if the funds are needed for a longer period and if conditions of the loan remain sound. When all is going well, this practice works little, if any, hardship to farmers. But it is likely to produce a false appearance of liquidity in banks, and in a time of stress farmers may be asked to pay before they are in position to do so without disrupting their farming operations. Both bankers and farmers should be benefited by a careful consideration of the time within which payment is likely to be possible and a

frank recognition of the necessary duration of the loan in the conditions of the note.

Most country banks have a customary rate of interest which is charged to the rank and file of borrowers. Nearly always, however, some farmers obtain preferential rates by reason of borrowing large amounts, offering excellent security, and carrying large deposit balances. While banks need some average rate on their loans in order to maintain themselves, it is not necessary that this rate be charged to all borrowers. Farmers who are more than ordinarily valuable to their banks may reasonably expect to receive advantages in the form of preferential borrowing rates. On the other hand, farmers who are poor credit risks and whose deposit accounts are a source of more expense than income to the banks find it difficult to secure loans even at the customary rate.

Interdependence of Banker and Farmer

What has been said here emphasizes the interdependence of banker and farmer. For the financing of current operations, most farmers have few, if any, sources of credit other than their local banks. Local banks, in turn, depend mainly on local deposits for their loan funds. The high charges for loans which are paid by farmers in many areas may be traced directly to the personal and agricultural risks involved in such loans and to the inadequacy of local supplies of deposit funds.

Because of this interdependence, farmers and bankers will profit most from an attitude of utmost frankness, sympathy, and fairness in their relations with each other. By making a complete and accurate statement of his financial position the farmer gains the benefit of the banker's opinion on the soundness of his proposed venture. The banker in turn is assisted in maintaining a condition that will enable him to finance the requirements of his farmer customers. By explaining frankly the reasons for refusing a given loan, the banker may save his farmer customer from an unwise venture and save his bank from the resentment of an offended customer. Frankness and fair dealing promote the most friendly relations between banker and farmer, with profit to both.

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MORTGAGE CREDIT USE REQUIRES CLOSE STUDY OF LONG-TERM FACTORS

At least once in the life of nearly every farmer there arises the question whether he will use farm-mortgage credit. Such credit usually represents a major credit transaction in which the farmer employs the greater part of his property to secure the loan, and assumes a debt which, on the average, continues in whole or in part for an active lifetime. Whether the mortgage results in improving the farmer's financial condition depends largely upon how he deals with several special problems connected with the proposed loan. The more important of these are the problems presented by the trend of prices during the term of the mortgage, the amount of the mortgage with relation to the productive capacity of the farm involved, the use that is made of the borrowed money, the cost in the form of interest and commission charges, and the conditions of repayment.

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At least once in the life of nearly every farmer there arises the question whether he will use farm-mortgage credit. Such credit usually represents a major credit transaction in which the farmer employs the greater part of his property to secure the loan, and assumes a debt which, on the average, continues in whole or in part for an active lifetime. Whether the mortgage results in improving the farmer's financial condition depends largely upon how he deals with several special problems connected with the proposed loan. The more important of these are the problems presented by the trend of prices during the term of the mortgage, the amount of the mortgage with relation to the productive capacity of the farm involved, the use that is made of the borrowed money, the cost in the form of interest and commission charges, and the conditions of repayment.

The more common occasions for a farm mortgage are the purchase of a farm, the improving or equipping of a farm already owned, or the funding or refunding of existing credit obligations. Land acquired by this means should give reasonable assurance of yielding an income covering interest and other fixed costs, in addition to operating costs. Improvements made by means of credit should increase farm production or decrease costs. Funding or refunding of outstanding debt should result in reduced cost of credit and in added assurance that payments will not fall due until funds for such payments are available or renewals can be arranged. Since the amount of the farm mortgage usually is several thousand dollars, and is materially larger than other farm credit transactions, the ultimate effects of accumulating interest are more serious than on other farm credits. Therefore it is important to have clearly in mind the means by which interest charges at least are to be earned, when deciding what purposes warrant the use of the farm mortgage.

Occasionally the farm mortgage serves a useful purpose in replacing or consolidating other forms of credit, as for example when local capital is depleted by crop failures or low prices or when for these or other causes local banks fail or bank credit becomes restricted. When capital funds are thus used for current operating purposes it is particularly important that the activities financed should earn the means of repayment and that returns should be set aside for that purpose.

Repaying Power Rather Than Borrowing Power Should Govern

Too often farm-mortgage loans have been limited only by what could be borrowed rather than by what could be repaid. If a mortgage loan is obtained from an established loan agency, this agency may limit the amount to a reasonable part of the value of the farm. But if a mortgage is given to the former owner in payment for land purchased it may represent practically the full selling price of the farm. As long as the land will sell for as much as the mortgage, the debt can be repaid by sale of the property. Usually, however, farmers do not sell their farms, but keep them as homes. If land prices should decline, the mortgage should normally be of such size as to permit of renewal. Particular caution in assuming mortgage debt is necessary when prices are high. If a first mortgage represents half the land value when prices are high, renewal may be difficult when prices are low, and for loans with higher ratios renewal may be impossible. When land values are low, loans more closely approaching sale values may be justified.

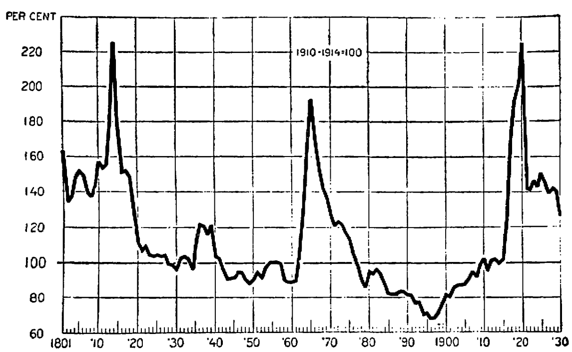

FIGURE 200.—Three times since 1800 prices have risen to very high levels—in 1814, 1865, and 1920. After each of these peaks prices have fallen sharply and then more gradually for a period of years. Debt incurred during these periods of high prices has been repayable under the difficulty of using dollars of greater purchasing power and product returns of smaller debt-paying capacity

Assurance that the farm, under proper operation, will carry the debt requires careful attention to the position and trend of the price level when the loan is made and to the term of years during which the loan is to run. If prices are high the farmer should, as far as possible, provide for such payment or reduction during the period of high prices as will make the debt of manageable proportions afterward. Since 1800, periods of decidedly high prices have been short, each period extending over a few years at most. (Fig. 200.) The abrupt rise of price peaks has been similar in each case and the subsequent drop has resulted in severe difficulty for heavily burdened borrowers.

Customary Periods of Indebtness

Except for amortized loans, the term of most mortgages is five years, but the average period of indebtedness for the encumbered farm is about 30 years. The debt-paying capacity of crops for each

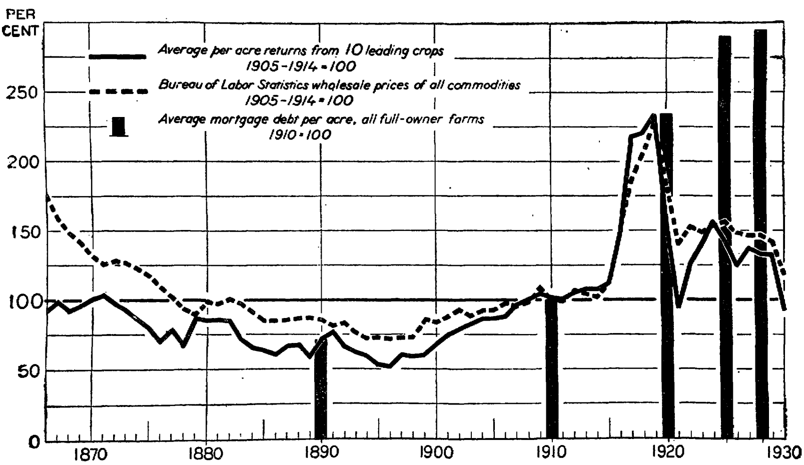

FIGURE 201.—Returns per acre of 10 leading crops, price level, and average debt per acre. The value of returns from the 10 leading crops has shown a fairly close relation to the general price level from 1866 to 1929. The amount of indebtedness per acre of owner-operated farms also showed a close relation to the general price level from 1890 to 1920. Thereafter, however, the debt increased while prices fell. The result was an increased burden with the means of carrying it reduced nearly one-half. During sharp price rises heavy indebtedness can be incurred only with danger of later difficulty

year since 1866, as shown in Figure 201, suggests the danger of contracting obligations during a period of high prices to be paid during years of low or average prices. Insufficient allowance for these factors during the war years and immediate postwar years has resulted in numerous farm bankruptcies and foreclosures.

Closely related to the amount to be borrowed is the method by which the debt is to be paid. Periodic reductions in the principal of the loan may be by an amortization plan whereby the debt is entirely paid through a long period of years, or by annual payments on loans running for a shorter term of years. When there are no provisions for such payments in the contract the farmer may attain the same end by setting aside from current farm returns amounts to be applied on the principal of the debt. In addition to having the merits of systematized saving, periodic payments lessen the danger from price

declines by retiring part of the principal with farm returns reflecting prices of products more nearly approximating the price level at which the debt was incurred.

Cost of Mortgage Credit

The cost of mortgage credit warrants close attention because of the usually large sums involved and the substantial part that interest commonly takes from farm earnings. In most of the farming areas higher rates will occur on loans from local sources, and on loans representing large proportions of the value of the property. Additional cost may appear in the form of commissions and fees, and in a higher sale price for land purchased when a large part of the consideration takes the form of a promise to pay.

The wise use of farm-mortgage credit requires that the farmer consider many long-term economic factors and many questions about the source of the loan as well as the terms and conditions involved. There is no other way, however, of borrowing with safety sums large in relation to the value of the security, unless the borrower has other unencumbered resources upon which he can rely. A large proportion of the cases of financial disaster that have overtaken farmers during the last decade have been caused by failure to weigh correctly the dangers as well as the benefits involved in the use of farm-mortgage credit.

DAVID L. WICKENS, *Bureau of Agricultural Economics.*

NEW USES FOR FARM PRODUCTS

CHEMICAL UTILIZATION OF FARM BY-PRODUCTS HAS LARGE PROSPECTS

The products and by-products of agriculture have been used in the preparation of chemical substances since prehistoric times. Starch, separated from roots and cereal grains by crude processes of milling, was one of the earliest organic chemicals prepared by man. Alcohol, as a constituent of wine and other fermented beverages, is another example of a very early chemical product, although its separation from its dilute solutions into pure concentrated form for industrial uses came about only after the discovery of the art of distillation.

A careful distinction must be drawn between agricultural-chemical products which are of primary origin and those of secondary origin. The products in the first group are produced directly by the plant or animal; cellulose, starch, sucrose, lactose, dextrose, citric acid, tartaric acid, fat, and protein are examples of this very large primary group. The products of secondary origin are obtained from the primary group by some process of chemical modification such as fermentation, dehydration, hydrolysis, oxidation, reduction, or destructive distillation. Alcohol, acetic acid, lactic acid, furfural, glycerol, dextrine, and methanol are examples of familiar chemicals belonging to this secondary group.

With the great advancement in synthetic organic chemistry during the past half century, it is possible to manufacture from inorganic materials many chemicals, originally derived from plants or animal substances. Several once-important agricultural industries, with long-established histories, have been forced out of existence by their inability to compete with synthetic chemical products. The cultivation of indigo, for centuries a leading agricultural industry of India and other tropical countries, has been almost completely eliminated by the introduction of synthetic indigo. In a similar way the cultivation of madder, at one time an important crop in various European countries, was obliged to retire upon the advent of the synthetic dyestuff alizarin the tinctorial principle of the madder plant. Great privations among certain agricultural populations were caused by the industrial revolutions which chemistry was thus bringing about. The loss of indigo and madder cultivation to agriculture was a fundamental loss, for the raw material from which these dyestuffs are synthesized is coal tar—a substance of mineral, not agricultural, origin.

Greater Achievements in Prospect

The ability of man to duplicate the products of nature in the future gives promise of even greater accomplishments than those that have been mentioned. The production of organic chemicals as a permanent outlet for agricultural raw materials would, therefore, appear at first sight to be somewhat hazardous, for no one can foretell the consequences of the new discoveries in chemistry. Industry will always seek the cheapest source of its raw materials, and the prices which the agriculturalist receives for his product must be sufficiently low to withstand the competition of synthetic chemistry. This challenge to the agriculturalist has been very strongly stated by a recent writer.

> Either the prices of farm staples must be low or these new organic syntheses come into play. In other words, methanol, ethyl alcohol, formic acid, acetic acid, and many other compounds are readily procurable from the elementary sources of coal and petroleum which bid fair to displace the vegetable sources of present supply. Certainly it behooves those in agriculture to ponder well the outcome of this gigantic impending battle, and to keep ever before them the fact that throughout man's competition with Nature, synthetic chemistry has never lost a battle. In the light of modern advance in organic synthesis it is not at all unthinkable to picture the complete demolition of crop cultivation.

The picture as thus sketched is, however, somewhat overdrawn. Although it is true that man has succeeded in synthesizing upon a profitable commercial basis a number of organic compounds hitherto obtained from plant materials, the record of such victories is small in comparison with the immense number of substances used in industry, medicine, and the arts for which man must still go to nature. In fact the more serious thinkers among chemists recognize a limitation of man's powers and admit the impossibility of ever synthesizing so complicated a compound as insulin, or egg albumin, with molecular weights as great as 35,000. While the chemist, to an increasing degree will add to the number of his successes in the field of organic synthesis, mankind for many centuries to come must continue to rely upon plants and animals for his supplies of protein, oils and fat, starch, cellulose, and many other necessities, not to forget some of those more elusive but highly essential minor food constituents such as the vitamins.

Farm Uses for Residues

Supplying our population with the basic necessities of food, clothing, and shelter, will continue, as in the past, to be the main object of agriculture, and the production of useful chemicals from agricultural raw materials will be largely confined to the utilization of the straw, stalks, chaff, culls, residues, and other by-products of the farmer's occupation. Even in the case of these residues the farmer must carefully determine whether they are not of more value to himself when converted into cattle feeds, fertilizers, or humus than when sold as raw materials for the manufacture of xylose, furfural, methanol, acetic acid, or other chemicals. Using them upon the farm as cattle feed or compost may in the end be more remunerative than selling to industry for a small pittance of cash.

Methods of using the cereal straws, the world's most abundant agricultural by-product, have attracted the most attention from chemists. In Europe straw is utilized upon the farm for composting, for thatching haystacks, barns, and other buildings, and also as a

cattle feed, for which purpose it has been subjected to various chemical treatments for increasing its digestibility. Straw is also used in Europe for manufacturing low-grade papers and is compressed into panels which are sold under the name of "thatchboard" for constructing the walls and partitions of buildings. Straw and cornstalks are also converted into building and insulating boards in the United States, but as raw material for this purpose they must compete with the waste of lumber mills. The destructive distillation of straw and cornstalks in producing carbon, illuminating gas, methanol, acetic acid, and other substances has also been done in the United States but not with complete economic success, since these products can be made more cheaply from other sources.

The most perfect chemical means for working up straw, stalks, hulls, and other cellular residues is the one that utilizes most completely each one of their three major components—cellulose, pentosans, and lignin. An estimate of the potential sources of cellulose, pentosans, and lignin in a few of the common agricultural residues of the United States is given in Table 11.

TABLE 11.—*Potential yields of cellulose, pentosans, and lignin in several agricultural residues of the United States*

Raw material	Annual production	Cellulose		Pentosans		Lignin	
	Tons	*Per cent*	*Tons*	*Per cent*	*Tons*	*Per cent*	*Tons*
Cereal straws	115,000,000	40	46,000,000	25	28,750,000	20	23,000,000
Cornstalks	100,000,000	50	50,000,000	24	24,000,000	20	20,000,000
Corncobs	20,000,000	40	8,000,000	35	7,000,000	20	4,000,000
Cotton stalks	18,000,000	42	7,560,000	25	4,500,000	25	4,500,000
Cottonseed hulls	1,800,000	40	720,000	38	684,000	20	360,000
Oat hulls	3,000,000	35	1,050,000	37	1,110,000	17	510,000
Flax straw	2,200,000	50	1,100,000	19	418,000	25	550,000
Sugarcane bagasse	500,000	50	250,000	28	140,000	22	110,000
Peanut hulls	70,000	40	28,000	18	12,600	30	21,000

This rough compilation is far from complete, as it does not include potato vines, weeds, and many other forms of residues which are ordinarily burned as trash. The figures are sufficient, however, to give an idea of the immense resources of cellulose, pentosans, and lignin in the agricultural waste materials of the United States. Of these three ingredients the market for cellulose as a raw material for the manufacture of paper, rayon, nitrocellulose, and other industrial products, is at present the most extensive. The market for pentosans as a raw material for the manufacture of adhesives, xylose, and furfural is very restricted. Sufficient xylose can be made from a few tons of corncobs or oat hulls to satisfy the present demands of the world for many years. One of the greatest services which the chemist can render agriculture is the discovery of new industrial uses for xylose and furfural, millions of tons of which can be manufactured each year from the pentosans in the residues of our cereal and other crops.

Lignin Market Limited as Yet

Lignin, the third major constituent of the straw, stalks, hulls, and other cellular wastes of agriculture, has at present a very limited market as a raw material for industrial utilization. The ultimate

possibilities in this direction seem, however, to be very great, and with reference to the utilization of lignin, synthetic chemistry stands to-day in about the same position as it stood over a century ago with reference to the utilization of coal tar in which such brilliant industrial achievements were later attained.

There is reason to suppose from the nature of its decomposition products that lignin may be the parent substance of the tannins, the flavones, the essential oils, and many other valuable aromatic constituents of plants. It remains for the chemist to discover the methods which the plant employs in converting lignin into these other substances and to duplicate them upon a large industrial scale. The working out of industrial methods for converting lignin into tannin would be of especial advantage not only for the utilization of a waste product but also for its aid in relieving the pending shortage of vegetable tanning materials. Experts of the Bureau of Chemistry and Soils are at present engaged upon this very important practical problem.

The monetary returns from the chemical utilization of agricultural by-products alone do not as a rule repay the expenses of production. They do, however, contribute substantially to increasing the total profits of a crop and have frequently helped to turn a deficit into a profit. Increasing the number of ways in which the products and by-products of agriculture can be utilized increases correspondingly the number of outlets into which crops may be diverted in times of surplus and overproduction.

The testing of the multitude of chemicals obtained from agricultural products for industrial uses is constantly disclosing unsuspected possibilities in their utilization. Ursolic acid, a new substance isolated from apple skins, by one of the department's chemists, has been found to greatly improve the gloss, water resistance, and brushing quality of cellulose lacquers. If there should be sufficient demand for this new chemical it would be possible to produce 500,000 pounds of it annually from the apple skins and pomace from cider factories, canning plants, and dehydrating establishments.

Even Weeds May Be Utilized

Even the weeds on the farm offer possibilities of chemical utilization. It has been demonstrated that goldenrod, one of the most widely occurring weeds in the United States, can serve as a raw material for the production of rubber. Neonicotine, a new alkaloid with valuable insecticidal properties, was first prepared synthetically from pyridine by one of the department's chemists. It has since been dicovered as a natural constituent of the weed *Anabasis aphylla*, which grows plentifully in the eastern Mediterranean countries. This is one of the rare instances of the synthesis of a compound preceding its discovery in nature. It is as yet too early to predict whether the synthetic or the natural form of this new insecticide will establish commercial supremacy. In this connection it should be remembered that the ability of a plant to produce a chemical can be improved by propagation. The ancestral form of the sugar beet was an insignificant weed, its original 5 per cent or less of sugar having been increased by selective breeding to nearly 20 per cent.

Future developments in the chemical utilization of the surpluses and wastes of agriculture are dependent (1) upon creating new uses for the immense quantities of cellulose, starch, sucrose, lactose, xylose, furfural, acetic acid, oxalic acid, methanol, alcohol, and other substances which can be obtained by known methods from our present reserves; (2) upon discovering new methods for converting lignin and other undeveloped plant constituents into useful chemical derivatives. The synthetic chemist should be viewed by the agriculturist not as an enemy who is to accomplish "the complete demolition of crop cultivation" but rather as a valuable collaborator who will help the farmer to derive greater profits from the residues which at present are wasted or only imperfectly utilized.

C. A. Browne, *Bureau of Chemistry and Soils.*

CITRUS BY-PRODUCTS MARKET IS GROWERS' SAFEGUARD IN YEARS OF OVERPRODUCTION

Citrus fruit trees were brought to Florida by the Spanish padres several centuries ago, but the citrus industry is of much more recent origin. It was well into the latter half of the last century that commercial shipments in this country were well established, and it is only within the last 50 years that the industry has been on a substantial basis. In 1899, about 6,000,000 boxes of oranges, 30,000 boxes of grapefruit, and 900,000 boxes of lemons were shipped from California and Florida. In 1930, about 48,000,000 boxes of oranges, 14,000,000 boxes of grapefruit, and 7,000,000 boxes of lemons went to market from the citrus-growing States.

This enormous increase in production has naturally been accompanied by not a few problems. Among the most serious of these has been the utilization of the surplus and cull fruits. As production increases, the proportion of unmarketable fruit also increases, and as the saturation point of consumption is approached, there is great danger of loss on fruit in the lower grades. An unusually large crop is a disaster if no means are provided for keeping the low grades of fruit from the market.

A cooperative by-product industry can go a long way toward stabilizing markets at any time, but in years of overproduction, it becomes the only salvation of the grower. A striking illustration of this took place in 1927 in the lemon industry. With the consumption in the United States and Canada of less than 15,000 carloads, all but 2,000 of which came from California, the lemon growers of that State were faced with the problem of disposing of 6,000 additional carloads. Not only was this amount of fruit, 78,000 tons, handled by their by-product company with a satisfactory return to the growers, but nearly 13,000 carloads were marketed, with a gross return exceeded but once in the history of their cooperative enterprise. Had 1,000 carloads of the fruit which was turned into by-products been placed on the market, the crop would probably have yielded one of the poorest returns on record.

Lemon Growers Were the Pioneers

Curiously enough, the smallest group of citrus growers, those raising lemons, were the first to make a start toward solving the surplus and cull problems. The greatest consumption of oranges and grapefruit

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has been during the winter and early spring months, whereas lemons are consumed largely during the summer. Their consumption depends upon weather conditions more than does that of other citrus fruits. A heavy crop of lemons coincident with a mild, cool summer meant disaster to the lemon growers before the by-product enterprise was established. Beginning in a small way, handling about 5,000 tons of lemons in 1917, the capacity and usefulness of this cooperative enterprise increased until, in 1927, the growers handled the largest amount of cull and surplus fruit ever produced in California. This fruit was converted into citrate of lime (from which citric acid is produced), essential oil of lemon, and pectin.

Citric acid is used in beverages, soda-water sirups, effervescent salts, and citrate of magnesia. The consumption is about 6,000,000 to 8,000,000 pounds per annum, of which about 20 to 25 per cent is supplied by citrus by-products operators. Essential oil of lemon is used for flavoring purposes and to a less extent in perfumes. Most of it is imported from Italy, about 1,000,000 pounds coming in annually. California produces about 10 per cent as much. Pectin is used by the manufacturers of jams and jellies to produce a satisfactory consistency in their product. It is contained in the peels of citrus fruits. The annual production is a matter of doubt as it is seldom sold pure, but, for the purpose of standardization, is either in solution in water or mixed with sugar. The citrus-fruit growers have sufficient material available to produce pectin to supply the world's demand.

Growers of oranges were slower in starting their by-products factory, but they too have come forward rapidly within the last few years. After failure to market orange marmalade on a scale that would use any considerable amount of fruit, attention was turned to other products, and a satisfactory business has been built up in making concentrated orange juice, essential oil of orange, and pectin. Carbonated orange beverages are popular, and large quantities of these products are consumed throughout the country. Recently, frozen orange juice has been made in Florida and California on a large scale, and quantities of surplus fruit have been used in this way. Several companies are doing a gross annual business of $1,000,000 each in orange by-products.

Grapefruit Culls Utilized

By-products from grapefruit have so far been confined largely to the canned fruit and the canned juice, but as 25 to 50 per cent of the entire crop is annually consumed in this way, the culls, consisting of misshapen, thick-skinned, and otherwise unmarketable fruit, are returning something to the growers. Grapefruit peel contains both essential oil and pectin, but there has been no commercial production of either from this source.

Up to the present the oranges and lemons used for by-products do not return to the grower the cost of production, and no grower contemplates growing the fruit for by-product purposes alone. The actual cost of growing lemons in California is about $35 a ton, but returns of more than $25 a ton from by-product utilization are rare. Although the cost of producing oranges is somewhat less than that of producing lemons, the returns from their use as by-products are not enough to pay for growing the fruit. Canned grapefruit will probably come nearer to paying its way than will the by-products of either of the other citrus fruits.

E. M. Chace, *Bureau of Chemistry and Soils.*

LIGNIN, FARM BY-PRODUCT, NOW WASTED, MAY SUPPLY CHEAP ORGANIC CHEMICALS

The various by-products of the agricultural industry, such as cereal straws, cotton stalks, corn stalks, and hulls, are composed principally of carbohydrates, chiefly cellulose and pentosans, and a substance called lignin. The quantity of lignin in the agricultural by-products listed above ranges from about 15 to 20 per cent of the dry weight of the materials. Approximately 225,000,000 tons of these agricultural by-products are produced annually on the farms of this country. This gives some conception of the potential supply of this substance. In addition to this, about 1,200,000 tons of lignin are produced annually in the paper mills of this country as a by-product in the preparation of wood pulp. At present most of this lignin is wasted.

The fact that lignin now constitutes an enormous industrial and agricultural waste, and because of its inherent possibilities as a cheap and abundant source of organic chemicals, has stimulated great research activity all over the world on its fundamental chemistry. It is now generally recognized among students of this subject that only after a proper understanding of the chemistry of lignin will it be possible to develop a rational program for its economic utilization. Attempts to utilize lignin by empirical methods, which were used in the past, have met with failure.

Lignin Related to Phenols

Investigations on the fundamental chemistry of lignin conducted by the Bureau of Chemistry and Soils have shown that the substance is chemically related to phenols. In view of the fact that ordinary phenol or carbolic acid is now used extensively in the preparation of synthetic resins, it seemed, by analogy, that lignin also would yield synthetic resins. As a matter of fact, it was found that under suitable conditions lignin will combine with furfural and with aromatic amines, such as aniline, dimethylaniline, ortho and para toluidine, cymidine, ortho and para nitraniline, meta toluylenediamine, benzidine, tolidine, and alpha and beta naphthylamine, forming resinous products that range in color from brown to black. Tests conducted on these resins indicate that they may be used in the preparation of varnishes. All the resins, with the exception of that obtained from furfural and lignin, belong to the soluble and fusible type.

When lignin is subjected to dry distillation it yields a series of organic compounds, such as guaiacol, creosol, normal propyl guaiacol, catechol, and vinyl guaiacol. Most of these substances possess antiseptic properties, and some of them, like guaiacol and catechol, are used to a considerable extent in the pharmaceutical and chemical industries. In addition to these compounds, other organic substances, such as wood alcohol, acetone, acetic acid, and anisic acid, have been obtained as products of distillation.

With the broadening of our knowledge of the fundamental chemistry of lignin, further developments in its economic utilization may be anticipated.

MAX PHILLIPS, *Bureau of Chemistry and Soils.*

FURFURAL, A PRODUCT OF FARM WASTES, HAS MANY INDUSTRIAL USES

The name "furfural" is derived from that of another farm by-product. One of the early investigators of furfural, which was first obtained in 1830, prepared it from bran and gave it its name, the literal translation of which is "bran oil." All farm wastes are composed chiefly of cellulose, lignin, and pentosans. Furfural is made from the pentosans. It may be produced by moistening ground corncobs with acid and water and heating the mixture. Furfural and water distil off together, and the furfural is then separated from the water.

Although furfural has been known for many years, it was until recently only a chemical curiosity selling for $30 a pound, at which price it was obviously of no concern to industry. About 10 years ago the problem of its production was taken up in the Department of Agriculture, and studies of the possibility of manufacturing it from corncobs were made. Yields were investigated, and special apparatus was devised. These studies demonstrated that furfural might be produced for industrial uses at a price which would make it readily available. As a result, the commercial manufacture of furfural from oat hulls was started, and it is this development which is responsible for the present production of furfural for the market. As a raw material, oat hulls are preferred to corncobs, chiefly because they are already in the factory as a by-product from the production of various foods. Since the cost of collecting is one of the biggest items of expense in the industrial use of any farm waste, the fact that oat hulls are on hand makes them a cheaper raw material.

Beginning with the first production of furfural for the market, up to and including 1929, its production has doubled every year, with a corresponding decrease in price, so that it can now be obtained in large quantities for about 10 cents a pound.

Commercial Uses of Furfural

Furfural has found a number of commercial uses. First and most important is its use in the manufacture of synthetic resins. When furfural is combined with a number of coal-tar by-products and heated, it forms a hard, shiny material which can be molded into various shapes. This is especially useful because of its insulating value. As furfural is rather unstable and becomes discolored when exposed to the air, it is not suited to the production of the lighter-colored resins. It is an excellent preservative, though its susceptibility to discoloration precludes many uses of this kind. Furfural is also employed commercially as a solvent. It is of value in the purification of rosin, because the impurities which discolor rosin in the natural state are highly insoluble in furfural. It is claimed that it may be similarly employed in the purification of anthracene, an important raw material for vat dyes. Furfural has been recommended as an ingredient of commercial lacquers, and it is now being used to a certain extent in the preparation of these substances. It also forms a number of compounds which can be used in the manufacture of rubber. A number of dyes have been made from furfural, but these are inferior to those made from other materials now in use. Furfural is an outstanding example of the possibilities that lie hidden in the by-products of the farm.

H. T. Herrick, *Bureau of Chemistry and Soils.*

UTILIZATION OF STRAWS AND STALKS LAGS AS OTHER MATERIALS COMPETE

In the production of the great staple crops, the small grains, the cotton, the sugar, and the timber of this country, there necessarily is grown an equal and usually greater tonnage of straws, stalks, cane, lap wood, and bark, for which in the main there is no large use, except as roughage, as fuel at the sugar houses, and in maintaining the fertility of the farm. A comparatively small percentage is sold for industrial uses, such as bedding for animals, paper making, board making, tanning, and the production of certain chemicals, such as acetic acid, alcohols, acetone, charcoal, and wood oils.

Practically ever since its organization the Department of Agriculture has been investigating methods of utilizing these waste products of the farm, and has been familiar with the efforts of others to develop uses for them. The fact that production of the staple crops which are the backbone of American agriculture, has increased, that prices are below the cost of production, that the farmers themselves are in the most difficult economic position occupied by any class of American people, has led again to an intense effort to utilize more extensively in industry the by-products of the farm, and has caused increased research and informational activity in the Department of Agriculture.

If and when they can be profitably and competitively utilized industrially, these farm by-products will have great value. The straws of wheat, oats, barley, rye, and rice, the stalks of corn and sugarcane, and the wild marsh grasses produced in this country annually, probably exceed 260,000,000 tons. This tremendous quantity of lignocellulose material is more than enough to make all the paper, fiber board, acetic acid, alcohols, acetone, and charcoal required by this country. At present these commodities are being made mostly from other raw materials, principally wood and corn, and under present economic conditions they can be produced more economically from those materials. Potentially, farm and town buildings can be lighted, and cooking can be done, with fuel made from farm by-products. Then why isn't it done? Why has not the Department of Agriculture, which has known of these problems for 50 years or more, solved them and pointed the way to the profitable utilization of these wastes?

No Market as Yet

Each year top and lap wood, and tan bark having a potential or theoretical value of millions of dollars, rot or burn on the farms or in the forests of this country. Again, why? The answer is clear cut and conclusive. With the exceptions cited below it does not pay to gather these wastes and try to sell them. There is no market for them. Nobody wants them because the things that can be made from them can be made more economically and more easily from something else.

When these wastes have a market use it is limited and is readily supplied by only a small percentage of the amount available. This is the case of waste woods used in making paper, insulation board, acetic acid, wood alcohol, acetone, charcoal, and wood tars; waste barks used in tanning; straws used in making straw and insulation board, and sugarcane and cornstalks used in making insulation board. The

total quantity of these wastes used industrially is almost negligible, and it yields the farmer but little profit.

The only industrial outlets for the above-mentioned farm products that have so far proved practicable and that give promise at this time of continuing are the utilization of waste woods for paper and board making and for certain chemicals; and to a limited extent the utilization of waste barks and woods for tanning and of waste straws, cornstalks and sugarcane stalks for making box, insulation, and building board.

Apparently these uses have possibilities of growth and perhaps of tremendous expansion. Other potential uses, although viewed with longing eyes by the farmer, and attractive and stimulating to the research worker, must await further development or perhaps more favorable economic conditions before the Department of Agriculture can recommend them to the farmer or to the business man. The Bureau of Chemistry and Soils and other bureaus of the department are constantly seeking profitable industrial uses for the by-products of the farm and forest, and will promptly make such uses known when they are developed.

F. P. Veitch, *Bureau of Chemistry and Soils.*

SWEETPOTATOES YIELD FINE WHITE STARCH BY A NEW PROCESS

Although cornstarch dominates the starch market in the United States, there is still a consistent demand for some other starches, which, on account of their distinctive properties, are preferred for certain purposes, those of high quality often bringing a premium. In this group are potato and cassava starches, of which there is imported each year an average of approximately 130,000,000 pounds, having a value exceeding $6,500,000.

In any plan for utilizing a farm crop as a source of starch, it is best to consider the possibility of producing a starch that will compete with imported rather than with domestic starch; furthermore, those crops which are now produced in abundance, or which could easily be expanded, should be considered before introducing a crop the success of which might be in some doubt. From this standpoint the principal crops of consequence from which starch could be produced in competition with imported starch are potatoes and sweetpotatoes.

Methods of Utilizing Cull and Surplus Potatoes and Sweetpotatoes

The problem of profitably utilizing cull and surplus potatoes has received the attention of several investigators, but no entirely satisfactory scheme has been evolved. The potato-flour industry which sprang up as a result of war conditions has now largely disappeared because of limited demand. Canning has held some promise as a means of utilizing both oversize and undersize cull sweetpotatoes, but since fresh potatoes are now available during practically the entire year as a result of improved methods of storage and distribution, the average yearly pack of canned sweetpotatoes appears to be declining. The production of sirup from sweetpotatoes has been suggested, but

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has not proved to be commercially practicable. The use of cull potatoes as stock feed, particularly for hogs, has some merit but, in general, the centers of hog production and of potato production do not coincide, so that this method of utilization is limited. The possibilities of utilizing the cull and surplus portions of these crops are thus apparently narrowed down to the production of starch or its derivatives.

In contrast to the practice in European countries where potatoes constitute the principal source of starch, there are in this country only a few small and simply equipped potato-starch factories. In view of certain factors, such as the premium in price at which potato starch of high quality sells, the extent of importation of potato starch, the recent increase in the tariff rate, and the possibility of utilizing sweetpotatoes as well as potatoes, it would seem practicable to extend the potato-starch industry in this country, particularly for production of high-grade starch. Locating starch factories in overlapping production areas of these two crops should aid materially in stabilizing the supply of raw material and in extending the manufacturing season, thus remedying two conditions which have been regarded as serious obstacles to an extension of the potato-starch industry.

Heretofore when the potato-starch process has been used, difficulty has been experienced in consistently obtaining a prime white starch from sweetpotatoes. As a result of recent investigations by the Bureau of Chemistry and Soils, it is now possible to produce a white starch of high quality from sweetpotatoes of any variety. It was found that objectionable pigments may be eliminated by a process which is somewhat similar to that used in the production of cornstarch and which involves the use of sulphurous acid and caustic soda. The principal function of the sulphurous acid is to keep certain pigments associated with the starch in reduced and colorless condition and to prevent oxidase action which is accompanied by pronounced darkening of the extraction liquors. The function of the caustic soda is to extract, after treatment with sulphurous acid, certain pigments which affect the quality of the starch.

Process for Sweetpotato Starch Production

The process of producing starch from sweetpotatoes consists of the following steps: The sweetpotatoes are washed and transferred to a grinder, where, after the addition of a 0.15 per cent sulphurous acid solution, they are pulped. Shaking or brushing screens are used for separating the starch from the pulp which, for high extraction, is again ground and rescreened. The separation of the starch from the water may be accomplished by allowing it to settle in tanks or tables, but it is preferable to use a continuous centrifugal machine. The starch is purified by being retabled two or three times and afterwards receiving a carefully controlled alkali treatment. The starch is stirred with the alkali for a few hours, after which it is allowed to settle overnight. It is then suspended in clean water, retabled, filtered, and thoroughly washed. In order to insure neutralization of all the alkali, the starch is suspended in a very weak acid solution (sulphurous or acetic acid) and is again filtered and washed. The starch from the filter is then ready for drying, after which it may be ground, sifted, and packed.

A complete pilot starch plant, erected by the Bureau of Chemistry and Soils at the Arlington Experiment Farm at Rosslyn, Va., has been used to test thoroughly the process described above. A general view of the equipment is shown in Figure 202.

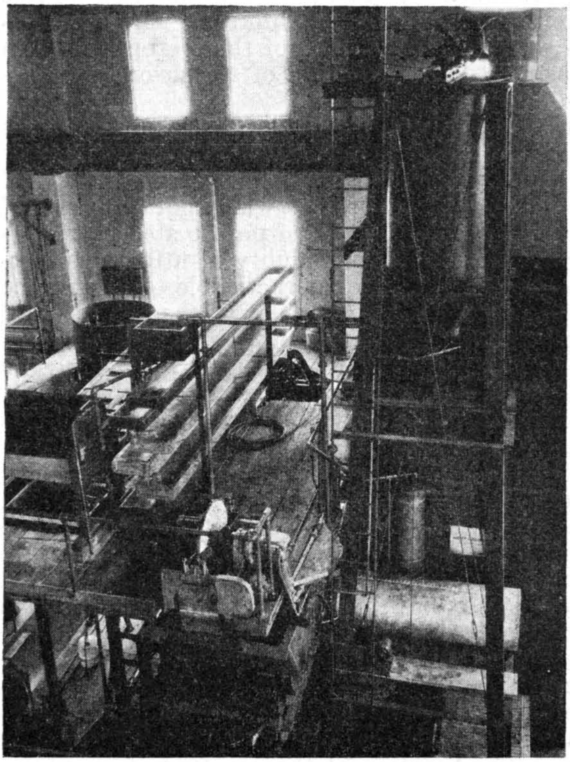

FIGURE 202.—Experimental starch plant, Arlington Experiment Farm, Va., showing tower tank, vacuum-filter outfit, tables, large tank and steep tank, and brushing screen

Properties of Sweet-potato Starch

The starch granules of sweetpotatoes are considerably smaller than those of potatoes, and a little larger than those of corn. Sweetpotato starch has a rather high gelatinization temperature and pastes prepared with water are much more stable on long heating than are potato-starch pastes. This is a valuable property in the sizing of cotton textile goods. The alkali pastes of sweetpotato and potato starches are about equally viscous. Sweetpotato starch made by the method described was approximately equal in purity to commercial starches of the finest quality found on the market.

R. T. BALCH *and* H. S. PAINE, *Bureau of Chemistry and Soils.*

FREEZING TO PRESERVE VEGETABLES AND FRUITS STILL IN PIONEER STAGE

The natural preservation of plant and animal tissue by freezing was undoubtedly observed by man for centuries before he discerned in this phenomenon anything useful in his daily life. In historical times atmospheric low temperatures, snow, and ice, began to be used for the cooling of foods and drinks to temperatures that made them more agreeable to the taste, discouraged development of the organisms of spoilage, and delayed decomposition.

For many years these natural refrigerants have been used more or less satisfactorily. Recent progress in mechanical refrigeration, together with changes in modern food-distribution practices, has greatly popularized the idea of everyday domestic refrigeration and has now brought preservation by freezing into striking prominence.

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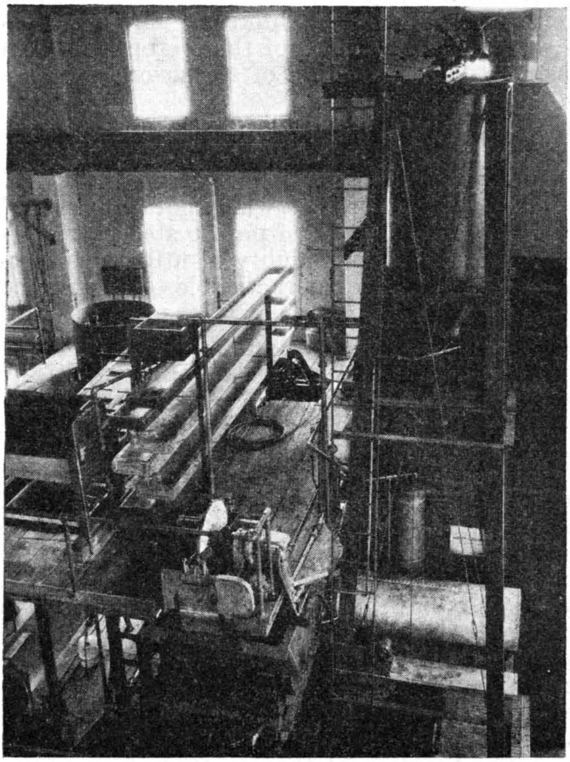

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The youth of this industry, as compared with the century of experience gained by the canning trade, which employs heat as the preserving agent, will suggest that the pioneering stage has not yet been passed. Many problems remain to be solved or are only partly understood. The stimulus for sustained and enthusiastic public interest in this new business arises partly from the fact that, in many instances, freezing preservation enables the consumer to have horticultural products in a condition as nearly equal to their fresh state as it seems possible to obtain them by any preservative means.

As a first consideration in successful preservation by freezing, emphasis must be laid upon the close relationship between the horticultural character, varietal peculiarity and maturity of the raw materials, and the final quality of the finished product. Fully ripened, sound fruits, washed in clean water and prepared for freezing under sanitary conditions with a minimum of delay, are essentials to a satisfactory product intended for freezing preservation.

Fungi, yeasts, and bacteria are almost universally present on fruits and vegetables in their natural state, and the activities of these as well as the life processes of plant tissues are materially hastened by higher temperatures such as generally prevail during the packing of the products. Hence any reduction in air temperatures, particularly to 40° F. or below, during the time required for preparation of the material is distinctly helpful.

Freezing temperatures do not necessarily terminate these life activities but do very materially retard them. When thawing takes place, some of these processes may be resumed with equal or even greater intensity than before freezing occurred. Discoloration of plant tissues by oxidation is such a phenomenon, one of much commercial significance, particularly for frozen fruits in small containers.

The Lessening of Discoloration

This discoloration may be prevented or lessened by several means, some of which are designed to exclude atmospheric oxygen from contact with the tissues, or to inactivate the organic ferments responsible for discoloration. The choice of a variety of fruit or vegetable best suited to freezing preservation may be very helpful not only in minimizing oxidation in fruits but also in improving the texture and the desirable culinary and dessert qualities of frozen horticultural products generally.

Blanching treatments at moderately hot temperatures have been effective in lessening the decomposition in freezing storage of such vegetables as peas, in improving the texture of spinach held at freezing temperatures, and in reducing the activity of oxidation ferments in such fruits as apricots and peaches.

Exclusion of air from the product is accomplished by a relatively high vacuum closure of glass or tin containers or by replacing the air in the head space by some gas such as carbon dioxide or nitrogen, the presence of which tends to suppress the activities of the organisms requiring air for life and development as well as to inhibit the completion of the oxidation cycle.

The Use of Sirups

Covering fruits with sirups of 40 to 65 per cent concentration while the temperature of the products is being lowered, has several advantages. The sirup tends to exclude air from the fruit surface, and in the case of small fruits such as strawberries and raspberries it makes less essential the use of a vacuumized container to prevent discoloration of the product. (Fig. 203.)

With some vegetables such as peas and beans a relatively weak brine, similar to that used for the product in heat processing, has been found to give a product superior in texture and culinary quality.

Sirup, if the concentration is fairly high, protects the fruit product against fermentation and spoilage. The natural color and flavor of many fruits seem to be better retained when sirup or sugar is present, and as a result of the gradual removal of water from the tissues, due to the action of the sirup on them, the fruits seem to be better prepared for the extraction of water, which takes place with some rapidity when ice formation sets in. As a result of this, the texture of the frozen product is improved when the fruit is thawed before it is used.

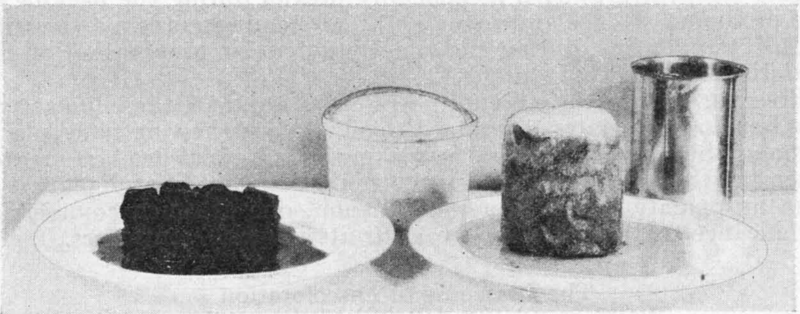

FIGURE 203.—Strawberries and peaches frozen in sirup

Although considerable discussion has recently been devoted to the merits of very rapid freezing in producing frozen horticultural products of high quality, there is some evidence that other factors besides the size and frequency of the ice crystals in the tissues are important in determining the ultimate quality of the product. In addition, very rapid freezing of plant products generally requires relatively expensive refrigerating equipment. It has been found from experience with the product after it is frozen as well as from the standpoint of economy that the use of temperatures of 0° to 10° F. for freezing horticultural products in small containers is preferable to the use of lower temperatures. This is particularly true when the freezing operation is so modified that the containers are exposed individually to the refrigerant, and preferably while in motion, thereby facilitating heat transfer from the product to the freezing medium, inducing relatively quick and even ice formation and allowing a satisfactory distribution of the sirup or brine in the product.

The best storage conditions for frozen plant products are not completely understood, but experience has shown that temperatures of 10° to 15° F. are reasonably satisfactory for most purposes.

Slower Progress in Vegetable Freezing

While the freezing of fruits such as strawberries, raspberries, and some varieties of cherries in small containers has been done commercially for several years, and even such light-colored tree fruits as apples, apricots, and peaches can now be purchased frozen in the food markets of the country, the freezing preservation of vegetables has gone ahead more slowly. The main reason for this is probably the present lack of information on the behavior of certain food-poisoning bacteria, such as the one causing botulism, when exposed to the temperatures and other conditions of freezing preservation. There is some evidence that freezing may weaken or kill the microorganisms responsible for fermentation and spoilage in frozen fruits. In the absence of such information about the spoilage organisms in vegetables it is safer to pack such products for freezing only under carefully supervised conditions and only where they will be marketed under conditions permitting the education of the consumer in correct methods of handling and utilizing the frozen food.

The proper distribution and use of frozen fruits and vegetables involves such distinctly new viewpoints of food utilization that it is probably desirable to exercise some restraint in applying this new method, and thus to avoid costly mistakes and wasted effort. Research and experience over a period of years should gradually make it possible for this young industry to develop to the proportions that its usefulness deserves.

H. C. Diehl, *Bureau of Plant Industry.*

FRUIT PRESERVATION BY FREEZING PRESENTS MANY PROBLEMS FOR RESEARCH

Small fruits preserved by freezing storage more nearly approximate the fresh fruits in color and flavor than do fruits preserved by other means. Preservation by freezing began about 20 years ago when the berry packers of the Pacific Northwest started experimenting with the preservation of berries by the frozen-pack method. This consists essentially in placing the fruit in barrels or other containers, with or without sugar, then freezing and storing the pack at relatively low temperatures—about 0° F. or a little below for the freezing and about 10° for storage. Most of the berries thus preserved are used in preserves, jellies, jams, marmalades, soda-fountain supplies and ice cream, and in pies and other pastries. More than 100,000 barrels of the 50-gallon size are being sold annually. The popularity of the frozen fruit is well attested to by the fact that of approximately 17,000,000 pounds of cherries handled by one of the Wisconsin fruit growers' unions in 1930, only about 8,000,000 pounds were sold as fresh fruit.

A great deal of research on preserving fruits by freezing has been done in the last two years. Fruits put up in containers holding 1 pound and less have appeared on the market. There has been a tendency to freeze these small containers at lower temperatures, anywhere from −20° to −50° F., as quick freezing retards enzymatic processes and also forms small ice crystals, which do not injure the tissues so much as do the larger crystals formed by freezing at higher temperatures.

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Freezing does not kill bacteria, yeasts, and molds, which are among the causes of spoilage in fruit, but it arrests their development, and as long as the product is kept frozen they do not become active.

A great deal is still to be learned about preserving fruit by freezing. There is as yet no common agreement on the best temperatures for freezing and storage, and at present all fruits do not lend themselves readily to freezing storage. Methods of retail distribution must also be worked out. The technological phases of the problem are being investigated by the Bureau of Chemistry and Soils.

ROBERT P. STRAKA, *Bureau of Chemistry and Soils.*

FERTILIZER DEVELOPMENTS

FERTILIZER INDUSTRY MAKING ADJUSTMENTS TO COMPLEX ECONOMIC REQUIREMENTS

Fertilizers as a means of increasing total crop production have little appeal under present conditions of agriculture, with large surpluses being produced in many instances at a cost exceeding the value of the products. As a means, however, of reducing the cost of production, they are of special interest. That the cost of fertilizers to the farmer might be reduced, the elimination of inert materials accompanying the plant food elements has long been advocated; but, primarily because of the nature of the materials available, this could not be accomplished. Improvement in commercial fertilizers has gradually gone forward but the greatest advance has been made since the World War.

The earlier industry was founded on the exploitation of natural deposits of phosphates, nitrates, and potash, and on the utilization of waste or by-products from other industries, so that the technology of the industry prior to the twentieth century consisted principally of hand mixing of the various available materials. The only chemical process involved was the manufacture of sulphuric acid used in converting phosphate into superphosphate. The principal part of the industry was in assembling and mixing the materials and in distributing the products. Mechanization of the plants and, in many instances, combination of sulphuric acid and superphosphate manufacture with mixing and distribution plants, were natural steps in the development.

Character of Goods Produced

Under this system the total of plant-food constituents in mixed fertilizers was limited to about 20 per cent because of the low percentage of these constituents in many of the basic materials, none of them carrying over 20 per cent with the exception of some of the potash salts. The treatment of phosphate rock with sulphuric acid gave a product with one-half the phosphoric acid content, diluted with calcium sulphate. Materials obtained as by-products from other industries were diluted by accompanying substances, which in the great majority of cases were of little crop-producing value. When more concentrated materials were available, the mixtures were diluted with filler to make them correspond to the customary formulas.

Influence of Nitrogen Fixation

The Fertilizer and Fixed Nitrogen Unit of the Bureau of Chemistry and Soils and its predecessors in the Bureau of Soils and the Fixed Nitrogen Research Laboratory, have been engaged for a number of years on problems involved in the production of concentrated fertilizers, including the fixation of nitrogen and the conversion of nitrogen products into substances suitable for fertilizers. The development of nitrogen fixation since the war has exerted a profound influence on the fertilizer industry and is transforming it into a chemical manufacturing industry. Before the war calcium nitrate and calcium cyanamide were the only fixed-nitrogen products entering American fertilizers, but since they could be used in only a limited amount, their effect on the industry was small. Since 1918, however, the production of ammonia by the direct synthetic method has made it possible to prepare a number of materials of high concentration containing one, two, or even all three of the principal fertilizer elements. The products from the nitrogen-fixation industry are characterized by concentration. Ammonia is the most concentrated nitrogen product, but since it can not be employed directly, it is transformed into products suitable for fertilizer use. By oxidation it is transformed to nitric acid. From nitric acid, with limestone, calcium nitrate is formed; and with soda ash, synthetic sodium nitrate. Ammonium nitrate is formed by combination of ammonia with nitric acid, or ammonium sulphate with sulphuric acid, and ammonium phosphates with phosphoric acid. Various combinations of these with each other and with potash salts are being produced or are suitable for utilization as fertilizers.

The development of more concentrated phosphates has been going forward simultaneously. The production of triple superphosphate for fertilizer use has been a reality for years and the production of phosphoric acid both by furnace processes and by chemical means gives promise of its more extensive employment in the near future as a carrier for the other two fertilizer elements. This use is already an actuality, but expected developments in the production of cheaper phosphoric acid will accentuate the employment of ammonium and potassium phosphates and similar compounds. A further recent development has been the direct addition of ammonia to superphosphate, whereby part of the phosphate is transformed into ammonium phosphate. The addition of ammonia is limited to rather small percentages but the increase in plant-food content is quite advantageous.

Higher-Analysis Fertilizers

The availability of more concentrated materials is resulting in the production of mixed fertilizers of higher concentration. While it was not advantageous and often not possible to make mixed goods of high concentration with materials from the older sources, with the new synthetic materials, mixtures carrying as much as 70 to 75 per cent of plant food may be made. A change to the production of more concentrated fertilizers is taking place as is evidenced by the fact that the average plant-food content of fertilizers in the United States in 1914 was about 12 per cent, while in 1930 it was 18 per cent. (Fig. 204.) This 50 per cent increase in plant-food content represents an increase of 486,500 tons of actual plant food in the fertilizer consumed in 1930 over what would have been contained in the same tonnage of

12 per cent fertilizer. Or it means some 4,000,000 fewer tons of mixed fertilizer to handle and on which to pay freight, than would have been necessary with 12 per cent goods. At an average freight charge of $3 per ton, this is a saving of over $12,000,000. With higher concentrations the savings will be increased proportionately.

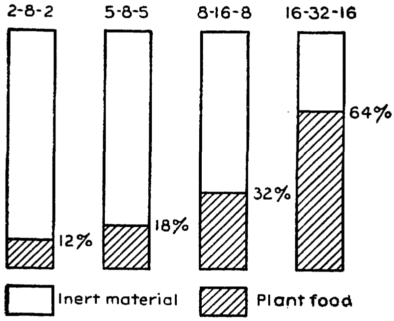

FIGURE 204.—Relative amounts of plant food and inert materials in ordinary, high-analysis, and concentrated fertilizers

Concentrated Fertilizers

The present day high-analysis fertilizers are only a step in the production of concentrated fertilizers. They may be made up from high-grade materials handled in the same way as the low-analysis goods, but the production of concentrated fertilizers involves new adjustments in manufacture, the solving of distribution and handling problems, the determination of agronomic relations and the education of the farmer in their use. That these changes are gradually taking place is revealed by a comparison in Table 12 of the new materials with the earlier materials employed.

TABLE 12.—*Comparison of sources, composition, and other characteristics of older and newer fertilizer materials*

Type of material	Source	Composition: Nitrogen	Composition: Phosphoric acid	Composition: Potash	Remarks
		Per cent	*Per cent*	*Per cent*	
Older materials:					
Sodium nitrate	Chile	15–16			
Ammonium sulphate	Gas plants and coke ovens	20			
Blood	Animal refuse	13–15			
Tankage	do	4–12			Naturally occurring, or by-product and waste materials.
Cottonseed meal	Oil mills	7–8	2–3	1.5–2	
Fish scrap	Fish	7–10	5–7		
Garbage	City waste	3.5	0.1–1.4	2.25–4.25	
Bone meal	Animal refuse	2–3	23–25		
Superphosphate	Phosphate rock		14–18		
Potassium muriate	German mines			50	
Potassium sulphate	do			48–51	
Manure salt	do			25	
Kainit	do			14	
Newer chemical products:					From chemical processes:
Sodium nitrate	Germany and United States	16			Nitric acid added to sodium carbonate.
Calcium nitrate	France and Norway	13			Nitric acid added to calcium carbonate.
Do	Germany	15.5			Nitric acid added to 5 per cent ammonium nitrate.
Calcium cyanamide		20.5–25			First fixation product used as fertilizer.
Ammonium nitrate	Germany and United States	34–35			Ammonia and nitric acid.
Urea (Floranid)	Germany	46			Ammonia and carbon dioxide.
Cal-urea	do	34			Urea and calcium nitrate.
Urea-phos	do	18	45		
Potassium nitrate	do	13.5		46	
Cal-nitro	do	20.5			Ammonium nitrate added to calcium carbonate.
Leuna saltpeter	do	26			Ammonium nitrate added to ammonium sulphate.
Ammonium sulpho-nitrate	France	25.5			Do.
Ammophos	United States	13 20	48 20		Ammonium phosphate and sulphate.
Leunaphos	Germany	20	20		Diammonium phosphate and ammonium sulphate.
Phosphazote	France and Switzerland	7–12	12–15		
Treble superphosphate	United States		45–47		Phosphate rock added to phosphoric acid.
Diammonium phosphate		23	47		Ammonia and phosphoric acid.
Potassium-ammonium nitrate		16		25–28	Ammonium nitrate added to potassium chloride.
Nitrophoska	Germany	15–17.5	11–30	15–26.5	5 formulas from mixtures of diammonium phosphate, ammonium nitrate, or urea and potassium chloride or sulphate.
Ammophosko	United States				Mixture of Ammophos, potassium sulphate, and ammonium sulphate.

As a chemical industry, the manufacture of fertilizers is related to highly technical processes as the source of materials and to agriculture in the disposition of its products. The industry must meet the competition of older materials as well as that of new chemical processes and better methods of manufacture. The consumption and distribution of its products will be determined by the relation of their prices to those of agricultural products as well as by the efficiency of the goods in crop-producing power, while existence as a chemical industry will depend upon production costs at least as low as those of the natural materials. Intensive study of problems associated with concentration is being made by the Fertilizer and Fixed Nitrogen Unit of the department and by various other agencies in this country and abroad. The preparation of concentrated fertilizers was initiated in this country and their utilization has been taken up in other countries, especially Germany. The advantages of the concentrated materials are apparent, and their extensive employment here will gradually follow the solving of problems encountered under American conditions.

R. O. E. Davis, *Bureau of Chemistry and Soils.*

FERTILIZER SOURCES AMPLE FOR MIDWEST, COST CUT BY HIGHER CONCENTRATION

The American farmer, in his agricultural operations, applies 8,000,000 tons of fertilizers annually. It is frequently pointed out that this is an average application of 40 pounds for each acre of land under cultivation in this country, as contrasted with 500 pounds for the Netherlands, where intensive farming is generally followed. But it is not necessary to go to Europe to find comparisons, for in this country there are even more widely divergent fertilizer practices between the Southeast and the Middle West, as illustrated by comparing Florida, with an average of 794 pounds per acre, with Kansas, with an average of only 1 pound per acre.

To account for this wide divergence, many factors must be considered. Some are the nature of crops, soil types, and geographical locations with respect to sources of fertilizer supply. While the staple crops are different in the different regions, yet there are few crops that do not respond to fertilizer use. While there are differences in soil types, yet there are few soils on which fertilizers do not give good results. Native fertility is no absolute safeguard against soil depletion, as has been amply demonstrated in agricultural experience. Unless provision is made for restoring to the land the plant food lost through the activities of various agencies, the best of soils may decrease in productivity through loss of some element of its fertility.

To prevent soil exhaustion is a function of fertilizers. To conserve labor, to permit the production of a crop unit with a reduced land unit and labor unit, in other words, to produce a crop unit at a reduced production cost, is the function of most immediate interest to the individual farmer.

Can there be any geographical limitation to these functions? Are they not of the same importance to the Middle West as to the Southeast? In accounting, therefore, for this wide divergence in fertilizer use, can the answer be found in sources of supply of fertilizer materials, and if so what can be done to meet the latent fertilizer requirements of the Nation's greatest agricultural region?

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Effect of Transportation Costs

It is more than a coincidence that in the Southeast where fertilizers are more generally used, by far the greater part is manufactured from close-by sources of phosphates, in Florida and Tennessee, and of synthetic and by-product ammonia, while at the various seaports, European potash is delivered by low-cost water transportation. It is estimated that the freight paid on the 8,000,000 tons of fertilizers used annually is at the average rate of $3 per ton. It is obvious that this rate mounts as distribution is attempted over regions more remote from production points.

Using present sources, the Middle West must look to Florida and Tennessee or to a single production unit in Montana for its phosphates, to the Atlantic or Gulf seaboard for its nitrates (although by-product ammonia is obtainable at various points less remote), and for its potash again to the seaboard of the East and South for the foreign product or to California or New Mexico for the domestic. In each case long hauls are entailed. To what extent does this added cost defeat the aim of more general fertilizer use in this region and how may it be reduced?

The reduction in transportation costs, it is obvious, follows the development of close-by sources as contrasted with remote sources of fertilizer supply. The length of haul, if measured in dollars instead of miles, it is less obvious, is further reduced by increase in concentration, for while freight charges are based on weights, fertilizers are paid for on the basis of analysis. The farmer pays for plant food. He is not interested in carriers, so long as they are noninjurious. Doubling the plant-food content halves the freight charge, and in effect, in terms of dollars, halves the distance over which the product is transported. It may be said that of two fertilizer plants, one selling a 20 per cent plant-food mixture and the other a 40 per cent, other things being equal, the one selling the more concentrated product will be only half as far from the farmer buying this product, wherever located, as the other. And by the same token, the farmer buying the less concentrated mixture places himself at a correspondingly greater distance from his source of supply.

Increasing plant-food concentration, therefore, brings the Middle West farmer closer to the fertilizer resources of the Nation, both in the Southeast and in the Rocky Mountain region. While the phosphate deposits of the Southeast have supplied the requirements of the United States and, until the development of the African deposits, those of Europe as well, and while they have been regarded as being so great that their exhaustion has been of no concern, they are quite limited in extent as compared with the western deposits. Surveys have revealed only 326,000,000 tons in the eastern deposits as compared with 5,000,000,000 tons in Wyoming, Montana, and Idaho.

The adaptation of the blast furnace to phosphate reduction as it is being demonstrated by the Bureau of Chemistry and Soils yields phosphorus which is by all odds the most concentrated form for shipping purposes which can be devised. One ton of phosphorus represents the plant-food content of 14 tons of 16 per cent superphosphate. At the same freight rate, a ton of phosphorus located 1,400 miles from the consumer would be as close as a ton of superphosphate located only 100 miles distant, although conversion into a usable agricultural phosphate at some near-by point is still involved.

Potash Deposits of Wyoming

In Wyoming, likewise, are the Nation's richest deposits of potash silicates, containing 200,000,000 tons of K_2O, which recent research indicates can be recovered concurrently with phosphorus to yield potassium phosphate of 86 per cent plant-food concentration. Close-by deposits of cheap coal promise low production costs and further offer the opportunity for ammonia synthesis.

Less remote are the potash deposits of Nebraska from which the Nation derived its chief supply of that agricultural necessity during the war years of potash famine. To what extent they can be brought back into production remains for research to determine. Undeveloped Texas deposits and deposits now under development in New Mexico provide additional supplies.

The future fertilizer requirements of the Middle West, therefore, seem assured. High concentration will reduce distribution costs so that these products can be delivered at costs comparable with those now prevailing in more favored regions.

J. W. TURRENTINE, *Bureau of Chemistry and Soils.*

FERTILIZER COMBINING SUPERPHOSPHATE WITH FREE AMMONIA SUCCEEDS

The first mixed fertilizers used in this country were prepared by mixing Peruvian guano or other nitrogenous material with superphosphate. To distinguish a mixture of this kind from a straight superphosphate it was commonly referred to as an ammoniated superphosphate. Within the last few years this same term has been applied to a mixture of a somewhat different character prepared by treating superphosphate with free ammonia.

The treatment of superphosphate with a basic material such as ground limestone, calcium cyanamide, etc., for the purpose of improving its mechanical condition, is a practice of long standing in the fertilizer industry. The possibility of using free ammonia in the treatment of superphosphate has also been recognized for some time, but its application for this purpose was not adopted until recently, owing to the relatively high cost of the ammonia.

The use of superphosphate as an absorbent for free ammonia was first applied commercially in the recovery of ammonia from illuminating gas. The ammoniated product obtained in this way was recommended for use as a fertilizer directly or after treatment with sulphuric acid to render the reverted phosphoric acid again soluble. This process, however, as well as others that have been proposed for a similar purpose, has so far failed to come into general use owing to the action of the superphosphate in absorbing toxic constituents of the coal gas in addition to ammonia.

Recently Developed Processes

In a series of processes described by more recent investigators the conditions of the ammoniation treatment are more or less reversed. In the original processes the superphosphate was necessarily shipped to the source of the ammonia and it served the double purpose of re-

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covering ammonia and supplying phosphoric acid for fertilizer use. In the later processes the ammonia is shipped in solution or as anhydrous ammonia to the source of production of the superphosphate, where it in its turn serves the double purpose of supplying nitrogen and acting as a conditioner for the superphosphate. With the commercial development of the synthetic process, free ammonia has become the cheapest form of combined nitrogen and its direct addition to superphosphate or superphosphate mixtures constitutes the most economical way of incorporating nitrogen in a mixed fertilizer. The consumption of free ammonia in fertilizer mixtures increased from about 5,000 tons in 1928 to 40,000 tons in 1930, and is likely to increase still further in the future. Its utilization in this way is one of the most interesting and important of the recent developments in the fertilizer industry.

The ammoniation of superphosphate or superphosphate mixtures is a comparatively simple operation and consists in adding a measured quantity of anhydrous ammonia or a solution of ammonia to a weighed quantity of the material or mixture in rotating drums or standard fertilizer mixers. The treatment of the superphosphate or mixtures containing superphosphate is usually carried out in batches of one-half ton to 1 ton each.

The rate of absorption of ammonia by a superphosphate containing the usual percentage of moisture is very rapid and is complete within one or two minutes, but the rate decreases with decrease in the water content of the superphosphate. The rate at which a superphosphate reacts with ammonia also decreases as its ammonia content approaches the maximum that it is capable of absorbing.

The ammonia is shipped in steel tank cars containing 50,000 pounds of liquid anhydrous ammonia. At the fertilizer plant the ammonia is either used directly as anhydrous ammonia, or it is absorbed in water to form a solution of ammonia of 25 to 30 per cent concentration.

The risk attending the storage of aqua ammonia is less than that of storing the anhydrous material. The use of the latter, however, has certain advantages over the use of aqua ammonia. It gives a drier product which shows less tendency to stick to the mixing apparatus and other equipment in which the treated material is handled around the plant. The quantity of ammonia in the form of a 25 to 30 per cent solution that can be added to the average superphosphate is limited to a maximum of about 2 to 2.5 per cent. Further additions give a mixture that is too wet and sticky. Anhydrous ammonia, however, produces dry mixtures of excellent mechanical condition up to the maximum that the superphosphate will absorb.

Limitation on Use of Free Ammonia

Both forms of ammonia, when added in excess of 2 per cent of the superphosphate present, bring about an apparent reduction in the availability of the phosphoric acid in the fertilizer as measured by the former official method for determining availability. The use of free ammonia was, therefore, limited to about one-fourth of the maximum that it is possible to include in a fertilizer mixture.

The apparent loss of availability that the superphosphate undergoes when ammoniated is due to a reaction between the ammonia and the components of the superphosphate to form a phosphate that is more or less insoluble as determined by the former methods of test-

ing. The authors of this article made a study of the composition and properties of the products formed in this reaction, and this study indicated that the availability of these products to plants should be greater than the official method then in use for measuring phosphoric acid availability would indicate. This was confirmed by the results of pot tests carried out by 20 State experiment stations with samples of the various forms of reverted phosphate occurring in ammoniated superphosphate.

The results obtained in this collaborative study showed that it should be possible at least to double the quantity of free ammonia used in fertilizer mixtures without appreciably decreasing the fertilizing value of the phosphoric acid in the mixture. Steps were accordingly taken by the official organization of the State control chemists which permitted an increase of about 100 per cent in the use of free ammonia in fertilizer mixtures. This will provide for an increase in the annual use of synthetic ammonia in this country of at least 80,000 tons having a wholesale value of about $8,000,000.

Aids Drillability of Fertilizer Mixture

When ammonia is added to a fertilizer mixture containing superphosphate a marked increase in temperature occurs almost instantly, owing to the heat developed in the reaction. The ammoniation of superphosphate is thus of further interest in fertilizer manufacture in that this heat may be utilized in driving off excess moisture or may be applied as an aid in the granulation of the product, whereby its drillability may be greatly improved.

The direct use of free ammonia thus offers the advantages that (1) it brings about a marked reduction in the cost of fertilizer nitrogen; (2) it greatly improves the mechanical condition of the mixture; (3) it prevents rotting of the bags by neutralizing free acid in the fertilizer; and (4) it affords a means for reducing freight and handling charges by increasing the concentration of the fertilizer.

WM. H. ROSS *and* K. D. JACOB,
Bureau of Chemistry and Soils.

POTASH EXTRACTION FROM UNITED STATES DEPOSITS STUDIED IN PROMISING EXPERIMENTS

Nearly every mineral found on the earth's surface contains some potash. The average rock contains about 3 per cent. Rocks containing as high as 5 and 6 per cent are not uncommon, although materials containing more than 10 per cent potash are extremely rare. A chemical process can not turn out a product containing anything not contained in the raw materials used. The possibility of developing a potash industry in the United States is dependent upon whatever deposits of potash minerals can be found in this country. Two promising deposits known are the greensand deposits of New Jersey and the leucite deposits of Wyoming. The potash content of the New Jersey deposits runs 5, 6, and 7 per cent; these deposits are tremendous in size, occur near the surface, are cheaply mined, and are relatively near the fertilizer market. The Wyoming deposits are not so extensive, although they are enormous; they are not quite so easily mined, and are farther from the present fertilizer market, but contain 10 and 11 per

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cent potash. In its experiments and attempts to develop a process for producing potash, the Bureau of Chemistry and Soils is concentrating its major effort on these two minerals as raw materials for the possible process.

Extracting Potash from Rocks

Rocks are rather difficult things for the chemical engineer to break up into their constituents. This does not mean that satisfactory chemical means are lacking, but merely that most of these means are too expensive, so that the cost of extracting the product is more than the product is worth. The bureau is attempting to subject these potash minerals to furnace treatment at high temperatures. Carload lots of the Wyoming rock and the New Jersey sand have been shipped to the bureau's laboratory and treated in a number of experimental furnaces. The minerals are heated to the melting temperature and as they melt the potash comes out of the furnace as a fume. This fume may be removed from the furnace gases by an electrical device known as the Cottrell precipitator. This process can be easily operated and by it more than 90 per cent of the potash in the rock should be readily recovered.

Potash from Wyoming Rock

The characteristics of the Wyoming rock and particularly its relatively high potash content make it somewhat more easily adaptable to furnace treatment, so that the bureau's experiments indicate that a commercial furnace in Wyoming treating this rock may ultimately be able to produce a potash fertilizer material in competition with potash from other sources.

Potash from New Jersey Greensand

The New Jersey greensand with its lower potash content and with the larger amount of impurities which the furnace must melt, and still more important the higher cost of fuel in New Jersey as compared with that in Wyoming, have made it more difficult for the bureau to develop a process that would produce New Jersey potash at a cost as low as the price of imported material. Developments in the greensand process are going forward very satisfactorily and it is not possible to predict whether the commercial utilization of the Wyoming potash deposits or of the New Jersey greensands will be the first undertaken by industry. The utilization of these and other of the country's natural resources should result in a potash industry comparable with the country's needs for fertilizers.

P. H. Royster, *Bureau of Chemistry and Soils.*

FERTILIZER PLACEMENT OF VAST IMPORTANCE IN COTTON-GROWING STATES

The difficulty sometimes experienced in securing a full stand of cotton, which is important in producing large acreage yields, may be caused by the use of poor seed, by environmental and climatic conditions, or frequently by the incorrect application of fertilizers. To obtain maximum results from commercial fertilizers in growing cotton, the method of applying the fertilizer, the time of application, and the placement of the fertilizer in relation to the position of the seed are important.

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A common practice is to apply the fertilizer in an open furrow, mix and cover it with several inches of soil a week or 10 days prior to planting the seed. This procedure has possibly been considered the best practice for many years but it has now become desirable to apply the fertilizer and plant the seed in a single operation, thus saving labor and expense. In each procedure the fertilizers may be placed too near the seed or in contact with it, frequently resulting in injury to germination and broken stands. However, less injury to cottonseed probably has occurred when the fertilizer is applied before the seed is planted, because under favorable soil-moisture conditions the readily soluble fertilizer salts will be dissolved in the soil moisture, and distributed and absorbed over a wider soil area, resulting in less concentration of fertilizers in the soil within the root zone of the young plants.

The necessity for precaution is greater in applying the newer fertilizers containing larger quantities and higher concentrations of readily soluble salts than in applying fertilizers manufactured before the war and containing relatively small quantities of quickly soluble salts and large quantities of slowly soluble nitrogen materials of vegetable and animal origin. The results of four years of experiments with cotton in Virginia, North Carolina, South Carolina, and Georgia show that fertilizers containing readily soluble salts applied under the seed or in contact with the seed simultaneously with planting caused less injury on heavy clay soils than on light sandy soils, and when fertilizers were applied to the side of the seed or under the seed two weeks before planting there was no injury to germination or to young plants. The amount of water-soluble salts in the soil within the root zone of the young plants three weeks after fertilizer application was greater where fertilizers were applied under the seed or in contact with the seed than where they were applied to the side of the seed. The degree of seed injury from fertilizers may vary with moisture conditions in the soil. In these experiments, in seasons of heavy rainfall, there was a smaller concentration of soluble salts in the surface soil and less injury to seed and young plants.

In using commercial fertilizers in growing cotton, precautions should be taken to apply them so as to avoid injury to seed and to young plants, yet they should be placed sufficiently near the seed to become available during the early period of growth. A supply of readily available plant food is essential in forcing the growth of cotton in the spring to achieve early blooming, fruiting, and maturing.

Experiments in South Carolina

Extensive experiments in efficient fertilizer distribution and placement with cotton have been made by the Department of Agriculture, cooperating with the South Carolina Agricultural Experiment Station and a joint committee representing farm-machinery and fertilizer manufacturers. A number of fertilizer-distributing machines used for cotton work were found to have cycles of delivery and distributed the fertilizer very ununiformly, resulting in an ununiform stand and growth of cotton. The more irregular the distribution of fertilizer the lower the yields. Some machines apply the fertilizers ineffectively in some cases so near the seed as to cause injury to germination or too far away from the seed to be most effective. In other experiments fertilizers were applied in more than 20 different locations with respect to the cottonseed. The results vary with the character of the soil

and with moisture conditions. On a sandy clay loam soil the placement of fertilizer did not interfere with stands of cotton except where the fertilizer was in contact with the seed. On fine sandy loams and coarse sands fertilizers applied at a depth of 3 inches or less below the seed caused considerable injury to germination, being more severe at the shallower depths and extremely severe when the fertilizer was in contact with the seed. With fertilizer placed at the side of the seed there were normal germination and good stands.

The increase in rate of a concentrated fertilizer above 200 pounds per acre was attended by injury to the stand when the fertilizer was

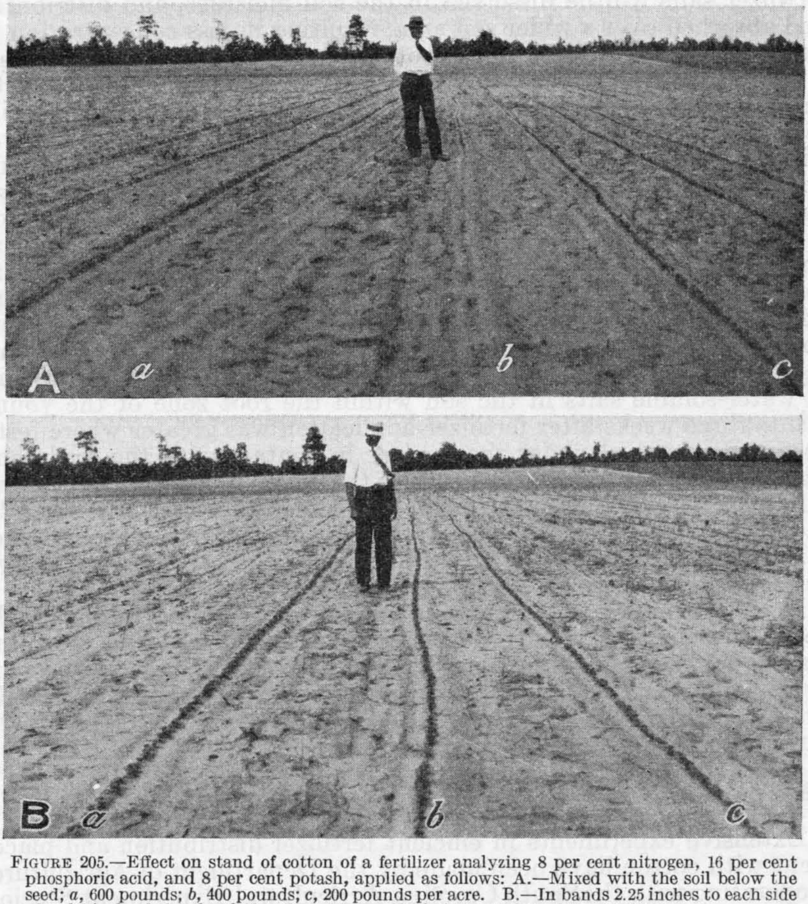

FIGURE 205.—Effect on stand of cotton of a fertilizer analyzing 8 per cent nitrogen, 16 per cent phosphoric acid, and 8 per cent potash, applied as follows: A.—Mixed with the soil below the seed; *a*, 600 pounds; *b*, 400 pounds; *c*, 200 pounds per acre. B.—In bands 2.25 inches to each side of and 2 inches below level of seed; *a*, 600 pounds; *b*, 400 pounds; *c*, 200 pounds per acre

applied below the seed, although no effect upon the stand was noticed where the fertilizer was applied to the side of the seed. In Figure 205 the stand of cotton resulting from applying a high-analysis fertilizer under the seed and to the side of the seed is shown. This cotton was planted April 22 and photographed May 17. The characteristics and distribution of mature plants resulting from the placement of the fertilizer are shown in Figure 206. In plots where the seed germination was retarded, early growth checked, or a broken stand prevailed small yields of cotton were produced.

If fertilizer is to be applied below the seed, as is the common practice, it may be found advantageous in using concentrated fertilizer or large amounts of ordinary analysis fertilizer, to apply a portion of the mixed fertilizer at planting time and the remainder as a side dressing after chopping the cotton. The greatest efficiency may be obtained from fertilizers when they are placed closest to the seed provided injury to germination is not serious.

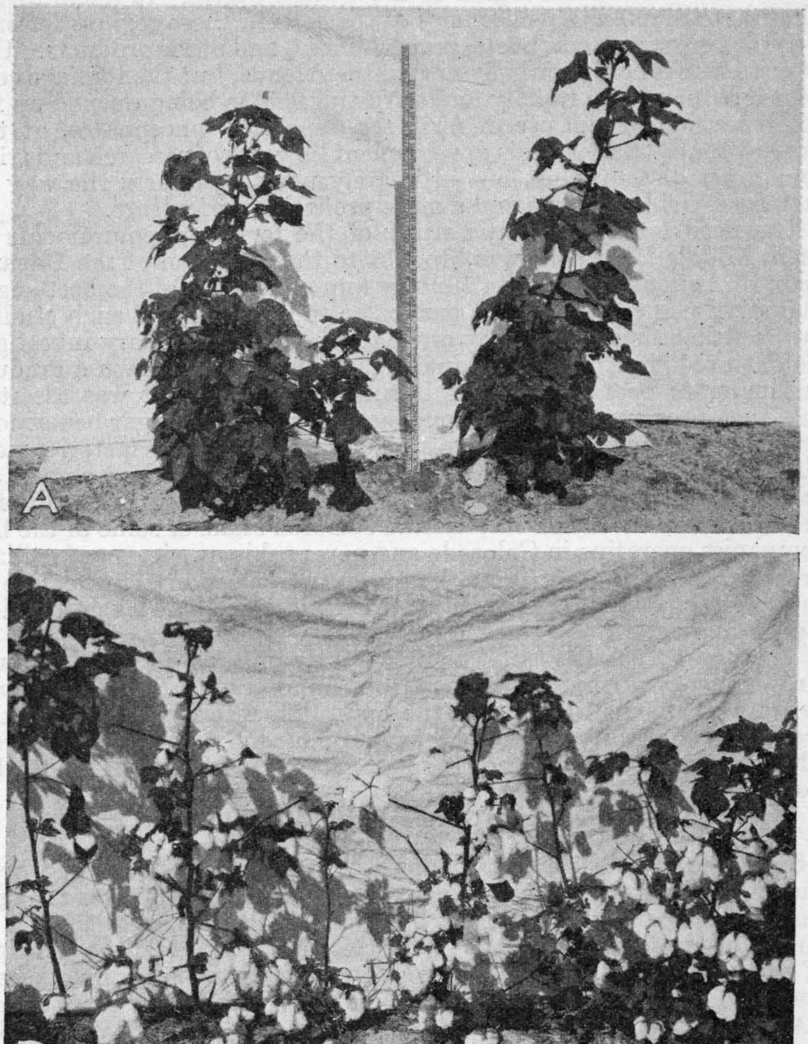

FIGURE 206.—Characteristics and distribution of mature cotton plants on a fine sandy loam fertilized with 800 pounds per acre of a fertilizer containing 4 per cent nitrogen, 8 per cent phosphoric acid, and 4 per cent potash applied as follows: A, in contact with seed; B, in bands 2.25 inches to each side of and 2 inches below the level of the seed

J. J. SKINNER, *Bureau of Chemistry and Soils.*

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FERTILIZER EXPERIMENTS SHOW PHOSPHATE IS CHIEF NEED IN THE MIDDLE WEST

There is an interesting fertilizer story about the Great Plains country and the intermountain region of the United States. It refers to the phosphate requirements of many of the soils in these regions for successfully growing sugar beets, grains, alfalfa, and other products. Use of fertilizers is comparatively new in these lands, but the tonnage consumed is increasing rapidly and a fruitful field is being opened up for the extension of the use of fertilizer, especially phosphates, at the present time. Back of this development lie years of research and trial, sometimes discouraging, but ultimately pointing clearly the way to increased yields per acre and a more profitable agriculture.

The need for a systematic study of the fertilizer requirements of these Middle West soils was brought to the attention of the Department of Agriculture early in 1921 by representatives of the beet-sugar industry, who emphasized in particular the necessity of such studies in the Arkansas River Valley of Colorado. A preliminary investigation showed that both yield and sugar content had shown a gradual decline since beet culture was begun in the valley; it was asserted that measures must be taken to make the growing of sugar beets more profitable to the growers and to the factories, since two factories were already idle; that fertilizer experiments in the past had shown no results; that nitrate was present at times and in certain places in prohibitive amounts. The officials and research staffs of some of the big companies operating in Colorado and now pushing a vigorous fertilizer program stated that fertilizers had been tried and found ineffective in these fertile western soils and that their influence on beet production was negligible.

There was then no fertilizer worthy the name sold in these regions. Growers were advised by some persons familiar with these conditions to let well enough alone, that the main difficulties were beyond the scope of soil-fertility investigations and remedial fertilizing measures. The department began some preliminary work in May, 1921, at Rocky Ford, Colo.

Triangle Experiments With Fertilizer

Since the nitrate content in these Arkansas Valley soils had been shown by the Colorado experiment station to be high, it was thought that a balance might be struck by applying the proper quantities of potash or phosphate, or both. With this view and to test the principle of balanced plant food, the now well-known triangle experiments were started. In these, all possible combinations of the three plant foods, nitrogen, phosphoric acid, and potash, were applied singly, in combinations of two, and in combinations of all three, in different proportions or ratios, to a total of 21 different combinations. By this means it is possible to determine readily a definite indication of which plant food is the most deficient in the soil, or the most effective in the fertilizer combinations, and to obtain some indications of the best and most profitable analysis. Several years' results are necessary, of course, to a final answer to the question, but even the first year's evidence was promising in showing that the fertilizers high in phosphoric acid seemed to be most effective. That year the flood which did such tremendous damage at Pueblo swept down the Arkansas Valley and overflowed the experimental plots to a depth of 5 or 6

feet, so mutilating them that it was necessary to abandon the project without obtaining any definite records of value.

The experimental work was resumed in 1922 at four different localities, at Rocky Ford, at Las Animas, at Wiley, and at Lamar. All these experiments indicated that fertilizers high in phosphoric acid gave good responses, although the lighter soils studied showed that a complete mixture was indicated for best results.

In the experiments at Lamar the yield from phosphoric acid alone was 15.2 tons of beets and 4,120 pounds of sugar per acre. Nitrogen alone produced 12 tons of beets and 2,897 pounds of sugar and where potash only was used, 10.6 tons of beets and 2,643 pounds of sugar per acre were obtained.

Where phosphoric acid, nitrogen, and potash were used in combination as a complete fertilizer, the yield of beets was no greater than with phosphoric acid alone, but 295 pounds more of sugar per acre were obtained. The average of the unfertilized plots was only 10.4 tons of beets and 2,738 pounds of sugar to the acre.

Conclusive Results at Grand Island, Nebr.

The first experiment at Grand Island, Nebr., in 1925, was located in a field leased by a sugar company for experimental purposes as being representative of the average farming land of that section. The returns for phosphate fertilizers were perhaps as conclusive as any results yet obtained. The unfertilized plots yielded 4.9 tons of beets per acre and only 1,361 pounds of sugar. The phosphoric acid alone produced 15.2 tons of beets and 5,253 pounds of sugar. Phosphoric acid with a little potash or nitrogen added gave 16.8 tons of beets and an even higher proportion of sugar. Eighty pounds of phosphoric acid, or 500 pounds of 16 per cent superphosphate per acre, were used in these experiments. Later experiments showed that the same amount could have been distributed over 2 acres instead of 1 without any material diminution of yield, so that about 30 tons of beets might have been obtained from 2 acres with the same amount of fertilizer. (Fig. 207.)

The experiments continued in following years in Colorado, Nebraska, Iowa, Minnesota, and North Dakota, have shown conclusively that this response to fertilizers high in phosphoric acid, and to superphosphate alone, is fairly characteristic of the soil regions in which sugar beets are grown.

The value of these experiments is accentuated by the low cost of the plant-food element most needed and the results to be obtained from an application of fertilizer as small as 125 to 200 pounds per acre of a 16 to 20 per cent superphosphate. Where the treble superphosphate is applied, not more than 100 pounds per acre is generally necessary. The cost of the fertilizer to the grower is from $2 to $3 per acre. With an average increase of 3 tons per acre at $6 per ton the additional profit is about $15 per acre—as much as the total value of a good wheat crop.

In 1922, when the soil-fertility work with sugar beets was started, no fertilizer was used commercially on sugar beets in Colorado, the largest and most profitable sugar-beet territory in the country. The beet-sugar companies adopted a fertilizer program based upon the results of the experiments conducted by the department in the Arkansas Valley. They started with a carload but the practice more than doubled with each successive year's results and recommendations. One of the com-

panies, observing in 1928 that the superphosphate-treated fields held the beet disease, known as blackheart, under control, has to-day an extensive phosphate program under way.

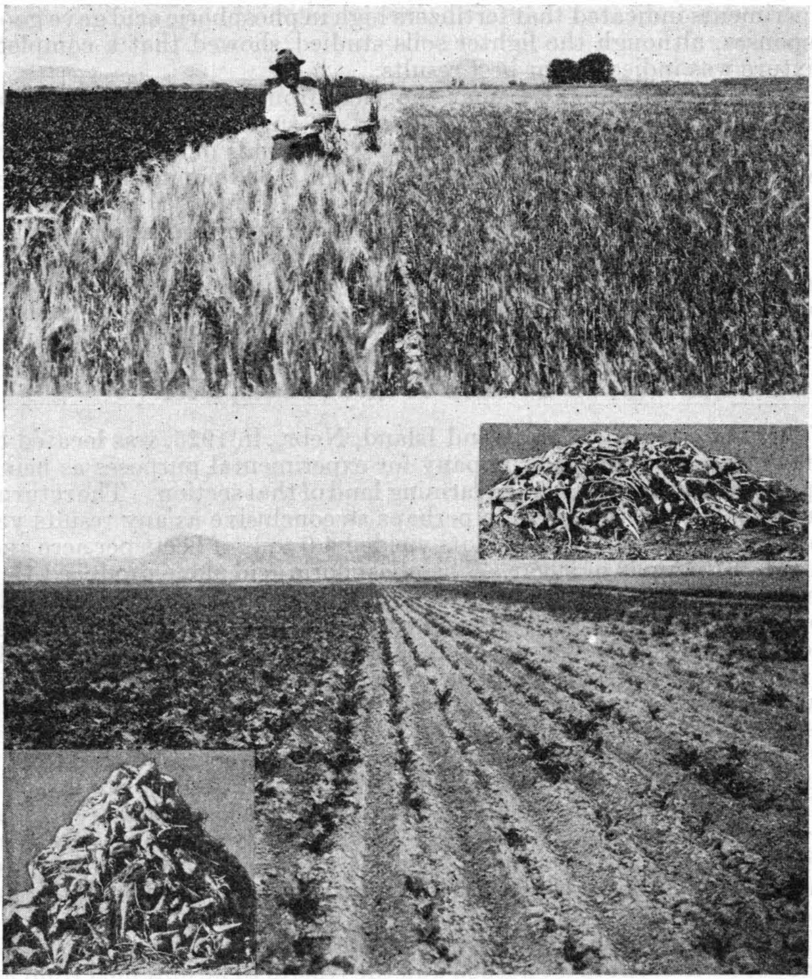

FIGURE 207.—Effect of superphosphate on grain and sugar beets on Middle West soils. On left, 150 pounds of superphosphate per acre; on right, no superphosphate

Superphosphate Distributed By Sugar Companies

When the soil-fertility studies were begun in 1925 in Nebraska no commercial fertilizer was being used on sugar beets. So striking were the results of the experiments by the department that in 1927, five carloads of superphosphate were distributed by one of the beet-sugar companies in its Nebraska territory. Other sugar companies also distributed it to their growers to mutual profit.

Inspired by the good results obtained in Nebraska, requests came for the extension of the soil-fertility studies to include Iowa, Minnesota, and North Dakota, which was done in 1926, when two complete tri-

angle experiments were started in Iowa, three in Minnesota, and one in North Dakota. (Fig. 208.)

Growing sugar beets in the Red River Valley of North Dakota and Minnesota was a new project and doubt was expressed as to whether they would need fertilization in such supposedly rich soils. Continued experiments, however, showed most convincingly that proper fertilization of sugar beets, even upon the rich Red River Valley lands, will pay. On account of the results obtained through the department's cooperative work with the sugar companies, several carloads of fertilizer were distributed by the sugar companies in that territory. In the sugar-beet region of northern Iowa the use of fertilizer is now made a part of the contract between growers and the beet-sugar company.

Steady Increase in Fertilizer Tonnage

From a single carload of fertilizer in Colorado in 1923, following the department's experimental demonstration of profitable results, the tonnage of fertilizer used has grown steadily throughout the sugar-beet territory as the result of this work of the United States Department of Agriculture, of the State experiment stations, of beet-sugar companies, and of fertilizer companies, and to-day the fertilizer consumed in the sugar-beet territory has reached a considerable amount. In one district every acre in beets in 1931 was fertilized with phosphate. No definite information is available at this time on the acreage of sugar beets that is fertilized this season, but it is estimated at 200,000 to 300,000 acres. With an average increase of 3 tons of beets per acre, at $6 per ton, the value of the 1931 crop was increased by about $5,000,000, at a cost for fertilizer approximating $700,000. The increased value in grain and other crops can not now be estimated, but the extended use of fertilizers for this purpose in Nebraska and adjoining States is very large.

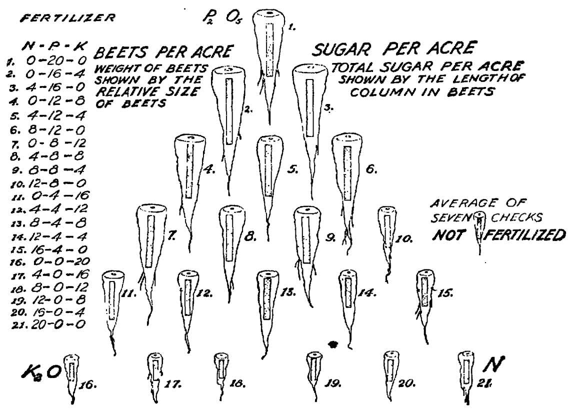

FIGURE 208.—Relative yields of beets and sugar obtained with different fertilizer combinations in Middle Western States, showing the phosphate response in these soils

OSWALD SCHREINER, *Bureau of Chemistry and Soils.*

TOBACCO IN SOME SOILS MAY REQUIRE SECONDARY ELEMENTS IN FERTILIZER

A complete fertilizer has been considered to be one containing the three essential elements—nitrogen, phosphorus, and potassium. Owing, however, to the complex materials previously used in their manufacture, the so-called complete fertilizers have contained considerable quantities of essential elements other than the three mentioned above.

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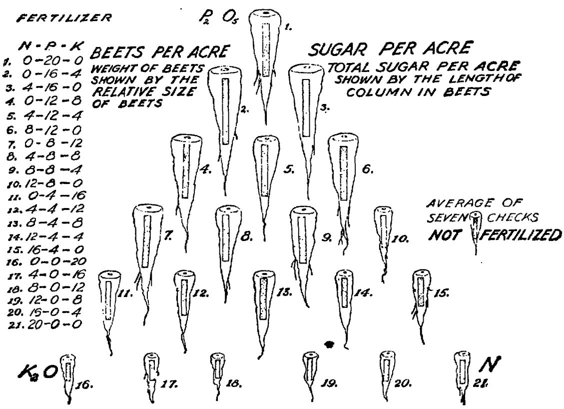

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However, there is at the present time a tendency toward the use of relatively pure chemicals to supply the three constituents heretofore regarded as constituting a complete fertilizer.

Elements Necessary for Growth

More than one-half of the tobacco crop of the United States is grown on sandy and sandy loam soils. These soils are relatively low in natural plant food and in this respect may approach the pure sand culture as used by the physiologist in his studies on the mineral nutrition of the plant. Recent investigations have shown that at least 10 elements need to be taken into account in any consideration of the mineral nutrition of the plant, namely, nitrogen, phosphorus, potassium, magnesium, calcium, sulphur, chlorine, iron, manganese, and boron. These elements are present in various quantities in tobacco soils, and their relative abundance determines what constitutes a complete fertilizer under a given set of conditions. Heretofore in general fertilizer practice only three of the above-mentioned elements—nitrogen, phosphorus, and potassium—which may be called the primary elements, have been given any serious consideration. When pure chemicals which supply only these three elements were used on some of the sandy and sandy loam tobacco soils very unsatisfactory growth was obtained. However, when the secondary elements, magnesium, calcium, sulphur, and chlorine, were supplied, growth was normal.

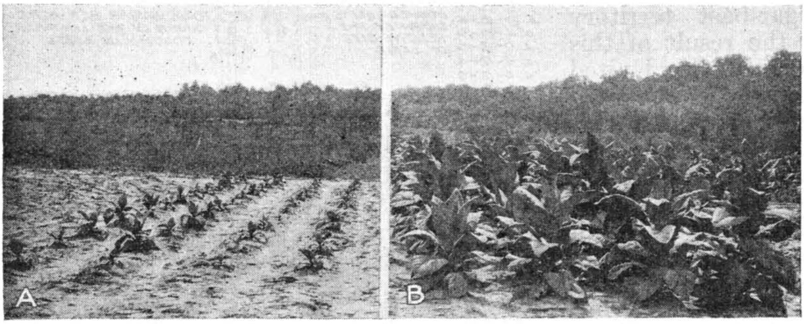

FIGURE 209.—A, Tobacco grown with a fertilizer mixture which did not supply calcium and magnesium; B, tobacco grown on a near-by plot which was fertilized with a mixture furnishing calcium and magnesium

Elements Deficient Under Field Conditions

Recent studies with the tobacco crop have indicated that magnesium and calcium are likely to be deficient when only nitrogen, phosphorus, potassium, sulphur, and chlorine are supplied. (Fig. 209.) The supply of sulphur sometimes appears to be insufficient during the early growth of the tobacco plant, this insufficiency slowing down the growth rate. However, as the season advances, either the soil supply gradually becomes available, or the rainfall seems to bring down sufficient sulphur, or the two factors combine to furnish enough of this element for the needs of the tobacco plant. Chlorine is another element that produces a decided effect on the growth of the tobacco plant. It is readily absorbed by the plant, and in conditions of comparative drought it may serve to prevent the so-called drought spot on

the leaves of the plant. This protective action from drought injury is not specific for chlorine, but also seems to be obtained from the element nitrogen when that is liberally supplied in the nitrate, ammonia, or organic form. This is particularly fortunate, because the use of chlorine may produce a leaf of low fire-holding capacity which is so undesirable in the cigar types, since these are grown with an abundant nitrogen supply. If large quantities of chlorine are absorbed by the plant when the soil moisture is adequate, the water content of the tissues may be raised to a point where the carbohydrate metabolism of the plant is so upset as to produce retarded growth. When chlorine is used in excess the cured leaf is of poor quality.

A shortage of manganese and iron so far have not been reported as occurring under field conditions with tobacco. Soils of neutral or alkaline reaction have been found in some instances to supply an amount of these elements insufficient for normal growth of other crops, but, in view of the fact that tobacco does not succeed well under these conditions, owing to disease, these elements have not been found to be practically important as fertilizer ingredients for this crop. The necessity for boron under field conditions has not been observed in this country, but a shortage of this element has been reported as producing a typical malnutritional disease in Sumatra. From a practical standpoint none of the other elements, such as copper or zinc, which have been reported by some investigators as essential to normal growth, has been shown to be of any importance in tobacco fertilizer practice.

Quantities of Secondary Elements Needed

The constitution of a complete fertilizer for tobacco depends somewhat upon the type of leaf to be grown. Special attention must always be given to effects on the quality of the cured leaf. The quantities, ratios, and sources of the three primary elements of commercial fertilizers have been fairly well worked out for the different types of leaf produced in this country, but it has only recently been recognized that fairly definite quantities of the secondary elements must also be supplied on some of the light soils used in growing this crop.

Information available at present seems to indicate that magnesium and chlorine should be supplied at the rates of 20 to 25 pounds per acre in soluble compounds. The quantity of calcium and sulphur should be 50 pounds or more per acre. Magnesium, sulphur, and chlorine should not be supplied in amounts greatly in excess of the quantities indicated, because they are injurious when used in excess. For those types of tobacco to which abundant nitrogen is supplied in the fertilizer mixture, chlorine should be omitted. The above quantities of the three or four elements, as the case may be, can be obtained by using appropriate amounts of standard fertilizer materials. Superphosphate may be relied upon to furnish the necessary calcium and sulphur in addition to the phosphorus. The magnesia may be obtained from oil-cake residues, sulphate of potash-magnesia, or dolomitic limestone. The chlorine, if necessary, can be supplied in the form of muriate of potash.

Tobacco Plant Shows Distinct Deficiency Symptoms

By observing the tobacco plant it is often possible to determine the element needed to constitute a complete fertilizer. It is characteristic

of this plant to develop distinctive pathological symptoms when any one of the essential plant nutrients is lacking in the soil, if the fertilizer mixture does not supply the element in question.

A deficiency of nitrogen is shown by the whole plant assuming a light-green color, with more or less yellowing and drying up or "firing" of the lower leaves to a light-brown color. A shortage of phosphorus, on the contrary, produces a plant that is abnormally dark green in color. A shortage of potassium and magnesium, in contrast with nitrogen and phosphorus deficiency, results in localized effects, with chlorosis of the lower leaves as the dominant characteristic. Typical potassium hunger is distinguished from magnesium hunger by the appearance of small necrotic spots or specks at the tips and margins of the chlorotic leaves. The chlorotic areas in the case of potassium hunger are yellowish, while when magnesium is lacking they are light green or white, with the principal veins tending to retain the green color in both cases. Under potassium deficiency the leaves turn or roll under at the tips and margins and in the case of magnesium hunger appear to cup up.

In contrast with the deficiency effects of the above elements are those typically occurring on the new growth or bud leaves and caused by deficiency in iron, manganese, sulphur, boron, or calcium. Of this group only calcium deficiency has been observed on tobacco under field conditions in this country. A shortage of calcium first becomes apparent as a peculiar hooking downward of the tips of the young leaves composing the bud, followed by a breaking down of these leaves at the tips and margins. If later growth takes place, the tips and margins show a cut-out appearance. In extreme cases of calcium shortage the terminal bud dies.

J. E. McMurtrey, Jr., *Bureau of Plant Industry.*

LIVING STANDARDS ON THE FARM

FAMILY LIVING STANDARDS DEPEND ON USE AS WELL AS ON SIZE OF INCOME

"The farmer's standard of living," is frequently spoken of as if all of the 6,000,000 farm families in this country enjoy the same living conditions. Actually, of course, farm-family living ranges from the very meager subsistance which is typical of certain unfavored sections, to the abundant and varied living available to some families in very fertile areas. And in every part of the country there are many families whose living conditions for one reason or another leave much to be desired, even in years of general prosperity. Any methods of improving these conditions which are within the reach of the family are worth consideration.

The level of family living on the farm depends upon several different factors—the size of the family's cash income, the efficiency with which it is spent, the food and fuel furnished by the farm for family use, the kind of house which the farm affords, the furniture and equipment secured in past years, the hours of labor on the farm and in the home, and the skill with which the homemaker uses the various materials available.

Cash expenditures are the usual measure of the standard of living of city families, who must purchase all of their food and fuel and, in most cases, pay rent. Most farm families, of course, raise a large part of their food supply, procure their fuel from the farm wood lot, and have the use of the house without money payment. Nevertheless the amount of money which a farm family has to spend is of very great importance in determining what its living will be.

In the rugged valleys on the western slopes of the southern Appalachian Ranges live many American farm families whose environment is frequently as difficult as it is beautiful. The slopes of the valleys are very steep, the soil is shallow and the valley floors are narrow. In many of the communities in this area making even a meager living takes long hours of work, great patience, and skill in overcoming geographic difficulties. The average money expenditure of 227 families in Knott County, Ky., a district typical of many parts of the Appalachian Highlands, was $450 in 1929. In spite of the fact that these families raised about two-thirds of their food supply, more than one-third of their cash expenditures went to buy food. Another third was spent for clothing, and the remaining small sum was used in buying the other things needed.

Varying Division of Incomes

The money incomes of these mountain families are of course lower than those of most farm families in the United States in normal years. When the family's cash expenditures are as high as $900, the division of the total is naturally quite different from that which is usual at the lower income levels. A study of 2,886 farm families in 11 States whose expenditures averaged $913 showed that only 24 per cent of the total was spent, on the average, for food, and 26 per cent for clothing, while half was left for household-operating expenses, the maintenance of health, education, recreation, savings, and other items that go to make up what we think of as typical American family living.

The highest average money expenditures shown in any recent study of farm-family living were made by a group of 40 families in Maryland, Vermont, Illinois, and Ohio, whose household accounts were analyzed by the Bureau of Home Economics. These families spent on the average $1,684, allotting only 19 per cent to food and 14 per cent to clothing, and having a full two-thirds of the total left for other items.

Whether the cash expenditures are large or small, it is clear that improving the use of the farm family's money income is one important means of improving family living. Even the wisest management will not, of course, convert an inadequate income into an adequate one. But by careful planning the homemaker can make the available income go as far as possible. She can see that all the needs of every member of the household are taken into consideration before the money is spent. And she can make sure that no important purchases are made until information has been secured on whether the goods about to be purchased are durable and well constructed and suited to the needs of the family.

Another means of stretching the family's cash income is by producing at home as much of the family's living as possible. In the Kentucky mountain group referred to above, a considerable proportion of the goods which the family consumed was produced at home. One-half of these families were doing their own shoe repairing, two-thirds were making quilts, three-fourths were making soap, and one-fifth were making brooms. A few were still using the spinning wheel, a few were weaving fine woolen blankets and coverlets, and a few were making furniture. Churning, canning, pickling, drying fruits and vegetables, and butchering were being carried on in every home. Many of these activities are not feasible, of course, in every farm household, but they are suggestive of the ways in which the cash income can be supplemented by the time and skill of the housewife and other members of the family.

Food Furnished by the Farm

The food which the family raises for its own use is perhaps the most important addition which can be made to the family income. Most farm families, of course, produce some of their own food supply, but frequently not enough to provide a completely satisfactory diet all the year round. In the Kentucky mountain group, the average money value of the food raised at home, and of the game and wild berries and cresses with which the families supplemented their diet,

was $430 a year, almost as much as the total amount of their money expenditures. For the 2,886 families with annual cash expenditures of $913, the average value of food furnished by the farm was $440, about the same as that for the lower-income group. For the group of 40 families with the highest money expenditure, the value of home-produced food was also highest, amounting to $540 a year. It is of crucial importance that food production in the garden and other parts of the farm should be carefully planned in relation to the dietary needs of the family, so that an adequate food supply may be provided in the most economical way.

The differences in housing standards between one rural section and another are greater than the differences in the money value of food consumed. The average value of the houses studied in the Appalachian county mentioned above was $340, while that of the homes occupied by 2,886 families in 11 States was almost $2,000, and the account-keeping families cooperating with the Bureau of Home Economics occupied homes valued at an average of almost $5,000.

In considering the betterment of the family living, many farm home-makers will think first of the improvements they wish to make in the houses in which they live. While the changes they desire may be impossible in years when cash resources are especially low, some important alterations may be carried out by members of the family, using supplies from the farm itself. Provisions for adequate sanitation, for instance, cost very little money, but they are imperative to the health of the family.

When the money values of all the goods and services furnished to these families by their farms are added together, the averages are found to be $546 for the Appalachian group, $684 for the 2,886 families in 11 States, and $876 for the 40 account-keeping families. These goods and services formed more than one-half the total value of family living for the first group; about two-fifths for the second group; and about one-third for the third group.

It is convenient to measure the total value of family living of any group of families by adding the average value of goods and services furnished by the farm to the average cash expenditures. Measured in this way, the total value of living of the three groups considered here amounts to $996 for the first; $1,598 for the second; and $2,560 for the third.

These figures can not, however, be compared directly with the money expenditures of city families. There are many elements in both the urban and rural situations which can not be measured in terms of their money value to the individual family. The feeling of security which comes to the family whose home and food supply are certain, even though its cash income is very low, is not the least important factor in the rural situation. Sunlight, fresh air, and quiet, which the farm family takes as a matter of course, have an important health value, even if it has never been stated in terms of dollars and cents.

The improvement of farm-family living is largely dependent, of course, upon increase in cash income, but it is also true that important changes can be made by planning family expenditures more carefully and by utilizing the resources of the farm with increasing skill for bettering the conditions of family life.

FAITH M. WILLIAMS, *Bureau of Home Economics.*

HOME ECONOMICS RESEARCH ASSISTS HOME MAKERS TO SPEND INCOME WISELY

The standard of living a family is able to maintain depends upon the money income of the family, its labor resources, and the ways in which both income and labor are used. Economical distribution of time and money makes possible a higher level of living when incomes are static. When the money income falls, the standard of living may be seriously threatened, if not drastically lowered. A shrinkage of the moderate income may mean only a lesser degree of comfort, but the shrinkage of low incomes may be a matter of health, morale, or even of life and death.

It is at such times, most of all, that the housewife needs knowledge of the foods the body requires and of the foods that furnish the best nutritive values for least money. She needs to know which foods, which household material or services can be substituted for each other, and she needs to know which the family can safely do without.

The broad function of the Bureau of Home Economics, which is to assist in maintaining and improving the standards of home life, was never more effectively served than during these last years of drought and unemployment. From every section of the country, from farm and city alike, appeals have come for information and advice which would enable the home maker to safeguard the health of her family in the present times of stress. County agents, home-demonstration agents, relief workers, and social-welfare organizations of many kinds have asked and received assistance in programs of community service. A food guide, in terms of low-cost foods exclusively, was issued for housewives and for relief workers, and this has been supplemented by a weekly press release designed to help the housewife to adapt the food guide to market conditions and to plan meals and recipes for food available within the minimum budget.

These are current emergency aspects of the practical service of the Bureau of Home Economics in maintaining standards of living. An increasing volume of mail, bringing evidence of appreciation and requests for further service of this kind, shows the timeliness of this work. Meantime, however, there has been no cessation in the long-range work of the bureau, one division of which has in view the better adjustment of large-scale production to consumer needs.

The direction of money expenditure, at all times vital in its effect on comfort and health, has come to be increasingly important since the home has ceased to be a self-sustaining unit and has become more and more dependent on goods produced outside. With the rapid development of modern industry, food, clothing, bedding, furnishings of all kinds—almost every article of household use and almost every kind of household service once produced in the home—are now produced commercially. The home, itself, so far as commodities are concerned, has become more important as a consumer than as a producer. The American home is in all probability the largest consumer's market in the world.

Difficulty of Judging Values

The consumer, however, is confronted with a staggering array of goods from which to choose and is too often left without means of judging their quality or adaptability to home needs. The home maker has to meet the requirements of her family with expenditures limited by the cash income and the usable labor resources of the home.

American farms and factories are equipped and organized for large-scale production of goods which must be sold in quantity to justify production costs. Competition in sales has multiplied variety of products, has increased the selling costs, and has launched a system of high-powered salesmanship which results in still further confusion of values.

The effect of all this has been to change the emphasis in certain practical fields of education and in none more than in home economics. The greater the distance between the man who makes or grows goods for home use and those who use these goods, the greater the need for education of the consumer in wise choice of the purchased commodities and the more important a study of consumer needs as a guide to production markets.

Such studies are being made by the Bureau of Home Economics in several projects now under way. Data on home expenditures showing the distribution among food, clothing, housing, health, savings, luxuries, etc., are being collected to show consumption trends and standards of living. Budgets are being collected to show the lowest incomes that permit an adequate standard of living. The food supplies of different population groups in several sections of the country are being studied and checked against the nutritive needs of those groups.

Standards for expenditures based upon real needs, and expressed in terms of materials to be bought, would not only be a guide to wise consumption, but should form the foundation upon which to build a stable production program. Volume production requires a stable market to keep it going smoothly. Any interruption of production brings unemployment, decreased incomes, lessened buying power, and decreased demand. There must be a better fit between consumer demand and goods produced, to provide stable income to purchase those goods. A production program guided by home needs, with the fewest steps between producer and consumer, will safeguard standards of living.

Such a production program must be established on the basis of ascertained facts, and it is to supply such facts in terms of consumer needs as well as trends of actual consumption, that the Bureau of Home Economics investigations in this field are made. Because the same set of facts can be used to guide the producer in estimating consumer demands, these studies should have double importance in promoting better standards of living.

LOUISE STANLEY, *Bureau of Home Economics.*

DIVIDING THE FOOD DOLLAR INTO FIVE PARTS HELPS TO SAFEGUARD LOW-COST DIET

For any family, careful planning is necessary to provide the best diet obtainable at every season of the year. This truth applies both to the city family which must purchase all of its food and to the rural family which produces part of its food and purchases the rest. It applies more emphatically to the family of small means anywhere, because the need of well-balanced meals becomes greater as the available food supply grows less.

The quantities of the different articles of food which are needed will differ from family to family, but the kinds of food required are the

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The effect of all this has been to change the emphasis in certain practical fields of education and in none more than in home economics. The greater the distance between the man who makes or grows goods for home use and those who use these goods, the greater the need for education of the consumer in wise choice of the purchased commodities and the more important a study of consumer needs as a guide to production markets.

Such studies are being made by the Bureau of Home Economics in several projects now under way. Data on home expenditures showing the distribution among food, clothing, housing, health, savings, luxuries, etc., are being collected to show consumption trends and standards of living. Budgets are being collected to show the lowest incomes that permit an adequate standard of living. The food supplies of different population groups in several sections of the country are being studied and checked against the nutritive needs of those groups.

Standards for expenditures based upon real needs, and expressed in terms of materials to be bought, would not only be a guide to wise consumption, but should form the foundation upon which to build a stable production program. Volume production requires a stable market to keep it going smoothly. Any interruption of production brings unemployment, decreased incomes, lessened buying power, and decreased demand. There must be a better fit between consumer demand and goods produced, to provide stable income to purchase those goods. A production program guided by home needs, with the fewest steps between producer and consumer, will safeguard standards of living.

Such a production program must be established on the basis of ascertained facts, and it is to supply such facts in terms of consumer needs as well as trends of actual consumption, that the Bureau of Home Economics investigations in this field are made. Because the same set of facts can be used to guide the producer in estimating consumer demands, these studies should have double importance in promoting better standards of living.

LOUISE STANLEY, *Bureau of Home Economics.*

DIVIDING THE FOOD DOLLAR INTO FIVE PARTS HELPS TO SAFEGUARD LOW-COST DIET

For any family, careful planning is necessary to provide the best diet obtainable at every season of the year. This truth applies both to the city family which must purchase all of its food and to the rural family which produces part of its food and purchases the rest. It applies more emphatically to the family of small means anywhere, because the need of well-balanced meals becomes greater as the available food supply grows less.

The quantities of the different articles of food which are needed will differ from family to family, but the kinds of food required are the

same. All of the nutritional needs of a family of five, with two adults and three children, will be met by the foods listed below. This list of foods is adjusted to families whose income is small and who can produce but little food at home.

SUGGESTED WEEKLY FOOD SUPPLY FOR FAMILY OF FIVE (TWO ADULTS AND THREE CHILDREN) WITH LOW INCOME

Flour and cereals (1 pound flour counts as 1½ pounds bread.).	20 to 24 pounds.
Milk	18 to 28 quarts.
Potatoes or sweetpotatoes	12 to 15 pounds.
Dried beans, peas, or nuts	1 to 3 pounds.
Tomatoes or citrus fruits	6 pounds.
Leafy or other green or yellow vegetables	4 to 5 pounds.
Other vegetables and fruits	10 to 13 pounds.
Butter	1 pound.
Other fats (including salt pork and bacon)	2 to 3 pounds.
Sugar, molasses, jellies	3 to 5 pounds.
Lean meat, poultry, fish	5 to 7 pounds.
Eggs	8 to 12.
Coffee, tea, cocoa, salt, baking powder, etc., as needed.	

This food supply will furnish the food elements known to be necessary for health, normal growth, and development. The amounts of some of the foods, however, are not as generous as might be desired, and whenever possible, the larger quantities of milk, eggs, vegetables, and fruit should be used. These foods contain important substances not found in sufficient amounts in the other articles of the diet. The larger quantities of all other items will be needed if the adults are engaged in hard work, and if the children are very active and are growing rapidly.

The Food Dollar of the City Family

The cost of this food supply will vary, at present retail prices, from about $7.50 to $10 a week. The exact cost will depend upon what varieties of food are chosen within each food group and the quality and form in which they are obtained, as well as upon the dealer and the services, such as delivery or credit, which may or may not be provided by the store at which the goods are bought.

When all the family's food is purchased, and at retail prices, expenditures for the various kinds of food will be balanced if the food dollar is spent approximately as shown in Figure 210. For a family with children this would mean:

25 cents for milk and cheese.
20 cents for vegetables and fruit.
20 cents for fats and sugars.
20 cents for breadstuffs, cereals, and legumes.
15 cents for other foods—eggs, lean meats, fish, and accessories, as salt, tea, coffee, and baking powder.

Food Expenditures of Farm Families

In most localities the farm family does not purchase all of its food, but produces much of it. Many farm families produce all the milk, butter, eggs, poultry, and vegetables, most of the fruit, and a large part of the lard and lean meat which they need.

These home-grown products may amount to from one-half to four-fifths of the money value of the entire food supply. In a recent bureau study of 2,400 farm families, food purchases were found to be restricted mainly to manufactured foods, such as flour, prepared cereals, sugars, cheese, and such accessories as coffee, tea, salt, or spices. The cash

outlay for food was relatively small, and was apportioned very differently from that of the city family. Each food dollar of these farm families was spent approximately as follows:

	Cents
Vegetables and fruit	15
Fats and sweets	25
Bread, cereal, flour	35
Lean meats or fish	10
Accessories	15

To be sure, foods produced at home cost time and energy, and may add somewhat to farm expenses. But this extra effort or expense is abundantly repaid by the improvement in the family's diet which it makes possible. By planning carefully for raising and preserving food at home, farm families with low cash incomes can enjoy throughout the year the kind of food which only families of moderate or large income can afford when all of the food must be bought. Their diet can be better than the low-cost diet suggested above, since they can include a larger proportion of milk, butter, vegetables and fruits, eggs, and lean meat and poultry.

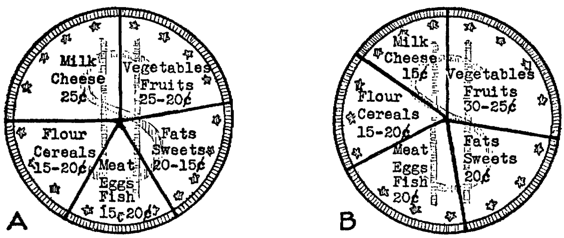

FIGURE 210.—Divide your food dollar into five parts: A, For a family with children; B, for a family without children

Better Diet Possible at Less Cost on Farms

The following weekly food supply shows the amounts of the different foods needed to provide this better diet for a family of five, with two adults and three children. Such a diet is within the reach of farm families who produce a large share of their food at home and of city families with moderate incomes.

SUGGESTED WEEKLY FOOD SUPPLY FOR FAMILY OF FIVE (TWO ADULTS AND THREE CHILDREN) OF COMFORTABLE MEANS

Flour and cereals (1 pound flour counts as 1½ pounds bread)	12 to 15 pounds.
Milk	28 quarts.
Potatoes or sweetpotatoes	10 pounds.
Dried beans, peas, and nuts	½ to 1 pound.
Tomatoes or citrus fruits	6 to 8 pounds.
Leafy or other green or yellow vegetables	6 to 8 pounds.
Other vegetables and fruits	15 to 25 pounds.
Butter	2 pounds.
Other fats (including salt pork and bacon)	2 to 4 pounds.
Sugar, molasses, jellies	5 to 7 pounds.
Lean meat, poultry, and fish	10 to 15 pounds.
Eggs	1½ to 2 dozen.

Coffee, tea, cocoa, salt, baking powder, etc., as needed.

This generous food supply provides fully for the nutritional needs of the family and allows considerable variety. It will yield menus much more interesting and appetizing than those of the low-cost dietary, and, what is more important, the body will receive larger quantities of the food elements which contribute to a high degree of health and vigor.

At present retail prices this list of foods may cost the city family from \$15 to \$18 a week. But the farmer with even a low cash income can

furnish his family with this excellent diet if he raises the right kinds of food in the right amounts, and if the housewife preserves the surplus for winter use. On most farms the acres devoted to home food production and the hours devoted to food conservation bring very gratifying returns.

HAZEL K. STIEBELING, *Bureau of Home Economics.*

MEAT DEMONSTRATIONS INCREASE INTEREST IN SUPPLYING HOME NEEDS

The problem of getting food from producer to consumer economically becomes greatly simplified when the producer is also the consumer. Specialization in certain branches of agriculture, such as cotton growing, has tended to change many farmers from producers to purchasers of their own home meat supplies. Yet, in recent years, meat demonstrations sponsored by extension and other specialists have done much to acquaint farm families with the practical possibilities of providing a considerable proportion of their home meat supplies.

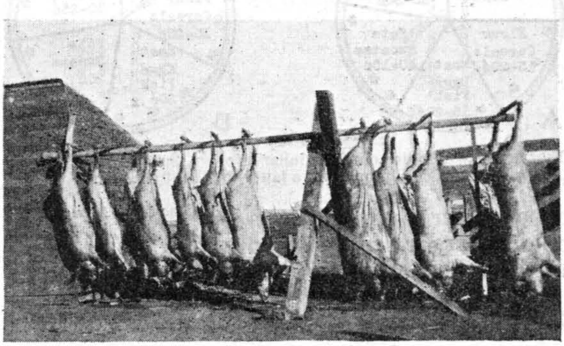

FIGURE 211.—Hogs slaughtered and dressed on a farm in Lamb County, Tex., as a result of a meat demonstration in that community in the winter of 1930-31

A typical example is a program of meat demonstrations begun in Texas in the fall of 1930. The activity was inaugurated by the Texas Agricultural Extension Service in cooperation with the Federal Bureau of Animal Industry, working in cooperation with county agents and home demonstration agents of the various localities. The extension specialists staged demonstrations in killing hogs, cattle, and lambs, and preparing meat products from these animals.

Demonstrations of Killing, Cutting, and Curing Methods

Demonstrations in killing hogs, cutting the carcasses, and curing and otherwise preparing the meat were conducted in 13 counties. These meetings were attended largely by the county and home demonstration agents of the counties involved and others near by, together with many rural leaders who desired to qualify themselves for conducting or assisting in similar demonstrations in their own localities. Each demonstration usually lasted a day and a half.

On the afternoon of the first day instruction was given in proper killing methods, from one to three hogs being killed for this purpose. On the second day the carcasses were cut up, the meat was put down in the cure, lard was rendered, and all by-products, such as sausage, scrapple, headcheese, liver paste, and mincemeat, were prepared by the women present, under the direction of a home-industries specialist.

Such a pork program has become very popular in many counties of the State. Twenty-five county agents conducted pork demonstrations in their own counties after attending and assisting in a district demonstration supervised by the meat specialist.

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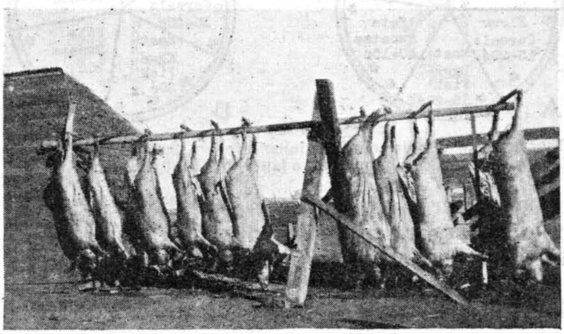

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Such a pork program has become very popular in many counties of the State. Twenty-five county agents conducted pork demonstrations in their own counties after attending and assisting in a district demonstration supervised by the meat specialist.

As a result of the pork program carried on in 12 counties around Lubbock, Tex., a ham and bacon show was sponsored by the South Plains Fair Association and the Lubbock Chamber of Commerce. There were 712 entries of cured and canned meat products, including 112 hams, 71 pieces of bacon, 47 shoulders, 11 samples of sausage, 91 containers of lard, and canned products such as roasts, chops, sausage, and scrapple. In connection with this meat show, a 4-H club fat-calf and pig show was held. The animals were sold at auction at the close of the show, most of them being purchased locally. This combined show was of outstanding value in increasing interest in farm butchering and meat curing. It was also a means of demonstrating what high-quality cured meats really were, as well as how they could be produced. Special killing, cutting, and curing demonstrations were held during the show.

FIGURE 212.—Meat products prepared from 15 hogs on a ranch in Texas. Many ranchmen are keenly interested in the home preparation of their meat supply

Beef and Lamb Programs Also Carried On

As much interest has been shown in the beef and lamb programs as in the pork programs, primarily because of the high production of cattle and sheep in the State. The beef and lamb demonstrations have been conducted in almost the same manner as have the pork demonstrations. A variety of beef products—some to be used fresh, some canned, some cured, and some dried—has been advocated. Lamb demonstrations have become especially popular, primarily because of the general lack of knowledge about handling lamb. Learning how to kill the animal and how to remove the pelt is stimulating lamb consumption, particularly in the important sheep-producing areas of the State.

The interest in the meat work, including beef, lamb, and pork, was evident from the number of people attending the meetings, as many as 125 people assembling to witness the demonstrations in most counties. As a result of these activities Texas farmers and ranch owners are increasing the production of their home meat supply. (Figs. 211, 212, and 213.) Agricultural agents report that many farm-

ers who previously kept no hogs on their farms now fatten from one to five or even more for home use. For many families home-canned beef was made available for the first time during the summer of 1931.

Meat Demonstrations Held in Cities

Interest in the meat program has not been confined to the farmers and ranchmen of the State. Meat demonstrations have been conducted also in towns and cities. Some were held to acquaint retailers with new cutting methods, others to furnish city housewives with information on selecting and buying both lamb and beef. A survey taken in four large towns in Texas during the spring of 1931 revealed that the consumption of lamb had increased as much as one-third after special lamb demonstrations had been given there.

FIGURE 213.—Neatly wrapped and labeled meat prepared for sale by a group of farmers in the south plains of western Texas

Though the interest in meat demonstrations in cities is noteworthy, the principal aim of the program in Texas has been to encourage a better-balanced meat supply for farm and ranch homes. In many instances pork had been utilized almost exclusively, and oftentimes the supply lasted only a few months. To encourage a more varied and adequate diet throughout the year, the present recommendations include beef and lamb as well as pork, and also other meats such as chicken and fish. The needs of a family of five adults appear to be well supplied by approximately two hogs weighing about 225 pounds each, one beef animal weighing about 550 pounds, and two lambs weighing approximately 85 pounds each.

ROY W. SNYDER, *Bureau of Animal Industry.*

COTTON IS UTILIZED AS NEW FOUNDATION MATERIAL FOR MAKING HOOKED RUGS

The program of the division of textiles and clothing of the Bureau of Home Economics includes projects that stress effective ways of using cotton and wool fabrics. In many cases the studies utilize materials already available and suggests ways of using them in the home to produce the best results. Whenever fabrics satisfactory for a particular purpose are not on the market, new ones are developed if a definite use for them is seen. An example of this is the recent development of an inexpensive cotton material for the foundation of hooked rugs.

Requests for such material were received from several Southern States where making rugs of this kind has become an established home industry. Until recently burlap has been used almost univer sally for such foundations but it has not been wholly satisfactory and there was a need for a more suitable fabric. The requests were prompted also

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Requests for such material were received from several Southern States where making rugs of this kind has become an established home industry. Until recently burlap has been used almost univer sally for such foundations but it has not been wholly satisfactory and there was a need for a more suitable fabric. The requests were prompted also

by a desire to find another use for a home-grown fiber. As a result, the Bureau of Agricultural Economics and the Bureau of Home Economics, working cooperatively, set up specifications for experimental fabrics, had them woven and then subjected them to scientific and practical tests.

Modifications were made in the original specifications until a satisfactory fabric was obtained. (Fig. 214.) It is 40 inches wide, the same yarn is used for both the warp and the filling, and has the same number of threads per inch fillingwise as warpwise. It has been sized lightly and then calendared to hold the fuzzy ends close to the yarn and to make the material easier to use. The new fabric possesses all the desirable characteristics of the best quality burlap and in addition is as strong in the warp as in the filling yarns.

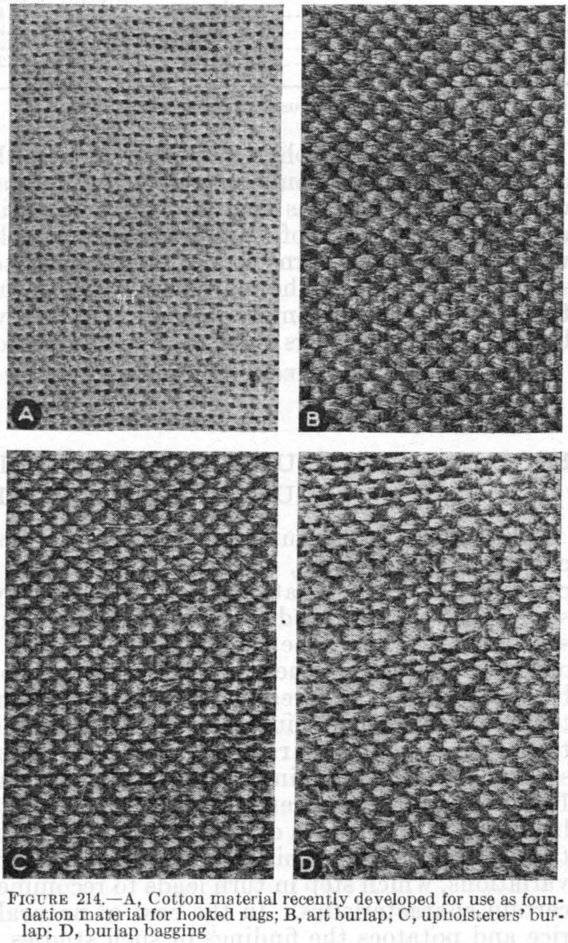

FIGURE 214.—A, Cotton material recently developed for use as foundation material for hooked rugs; B, art burlap; C, upholsterers' burlap; D, burlap bagging

Comparisons With Other Materials

In Table 13 the cotton material is compared with the various kinds of burlap ordinarily used. The cotton is almost identical in construction with the art burlap which is the grade found in many high-quality commercial rug patterns. The thread count, weight per square yard, and thickness are practically the same, but the tensile strength of the two materials differs conserably. The cotton warp shows a strength of 126.4 pounds as compared with 85.6 pounds in the burlap; but the filling yarns of the burlap are stronger than those in the cotton. These figures indicate that the burlap is unevenly balanced and it seems logical to assume that the warp yarns would break sooner than the filling. This is always a serious defect in any fabric. Also the jute fiber in the burlap is known to deteriorate rapidly when exposed to moisture or sunlight, and under ordinary conditions of wear to become brittle and lose much of its strength, whereas cotton fabrics offer greater resistance to moisture and sun.

TABLE 13.—*Comparison of a new cotton material with the various kinds of burlap ordinarily used for hooked-rug foundations*

Fabric	Weave	Thread count per inch		Weight per square yard	Tensile strength per inch [1]		Thickness
		Warp	Filling		Warp	Filling	
		Number	*Number*	*Ounces*	*Pounds*	*Pounds*	*Inch*
Cotton material	Plain	14	14	13.1	137	133	0.035
Art burlap	do	12	12	11.5	85.6	176.2	.026
Upholsterers' burlap	do	13	13	8.4	105	97.5	.031
Burlap bagging	do	12	12	8.4	69.0	56.8	.036

[1] Strip samples 1 inch in width used for tensile strength tests.

Besides satisfying physical requirements, the new material meets certain practical demands made of any foundation fabric. It takes a design readily, remains taut in the frame during the hooking process and carries any type of filler that the rug maker wishes to use. The weave permits the yarns to slip apart easily to admit the needle and springs back to hold the loops in place. In order to judge the possibilities of the cotton material and the ease with which it could be handled, complete rugs were made using various kinds of fillers.

BESS M. VIEMONT, *Bureau of Home Economics.*

FOOD-QUALITY STUDIES ELICIT FACTS THAT SERVE AS GUIDE TO PRODUCERS

"Standards for consumers" and "consumers' information" are becoming familiar terms, and with good reason. It is desirable for the consumer to know what contributes to quality or what constitutes a standard for every product he is selecting. But standards can not be set up arbitrarily. The characteristics of any product, manufactured or grown, are determined largely by production conditions as well as by variety. For this reason, the best way to aid in the present effort to increase consumers' information is to help the producer find out how to develop quality characteristics in his product. This is the aim of several studies set up in the food utilization section of the Bureau of Home Economics. Many times an investigation of this kind must begin with an analysis of differences in certain properties that contribute to quality. This is a step toward finding out the reason for variations, which step in turn leads to recommendations for modifying certain characteristics. In the case of natural food products such as rice and potatoes the findings of such studies are of greatest concern to the producer because he must apply them for the benefit of the consumer.

Rice Varieties Differ in Cooking Qualities

Because of differences noted in the cooking qualities of rice, a study has been made of eight native-grown rices. These eight varieties comprise the major part of domestic rice now on the market for cooking purposes.

A preliminary study bore out the general observation that rices when cooked by the same method differ greatly in wholeness and stickiness of the grain. Tests then made showed that different rices required dif-

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A preliminary study bore out the general observation that rices when cooked by the same method differ greatly in wholeness and stickiness of the grain. Tests then made showed that different rices required dif-

ferent lengths of time for satisfactory cooking. This fact is of significance to the producer because it warns him not to mix varieties in marketing rice. The native rices studied were ranked by the use of a score card, in the order of their desirability for boiling. Some varieties are much better than others for boiled rice, in which the aim is whole, distinct grains. The fact that both the method and the variety of rice influence the cooked product is of interest to home makers. The best variety of rice may be ruined by being boiled too rapidly or for too long a time, while rice with poor cooking qualities may be so handled in cooking as to give a fairly desirable result.

Samples of each lot of rice are being held in storage, and will be studied each year to determine the effect of aging on both quality and cooking behavior.

At the present time the rice used in commercially canned soup is Patna rice, which is imported duty free from India. To be desirable for use in canned soup a rice must give a clear liquid, a firm, whole kernel, and leave little deposit in the bottom of the can. A comparison of eight native-grown rices with the imported Patna for use in canned soups showed that Rexoro, an American-grown Patna, was the only one that approached the Patna in desirability for this purpose. (Fig. 215.)

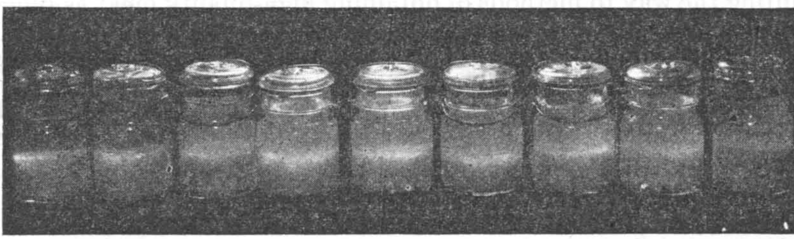

FIGURE 215.—Rice varieties used in canned soups. Patna at extreme left; Rexoro next. Note clearness of these as compared with other samples

The other native rices rank in about the same order for soup as they ranked for boiled rice. The fact that the Rexoro does not serve quite as well as the Patna would seem to indicate, that variety alone does not cause the difference. The cause may be cultural methods, it may be aging, it may be milling. Further study to clear up this point is under way.

Potato Production and Storage Methods Affect Cookery

A study on potatoes has been set up, cooperatively among the Bureaus of Home Economics, Plant Industry, and Chemistry and Soils, to determine the relation of such factors as fertilizer ratios, breeding, and storage upon the cooking qualities of potatoes. The results of cooking tests show that the temperature of storage has a marked effect on the quality of potatoes for deep-fat frying and other methods of cooking. A low storage temperature increases the amount of sugar in the potatoes so that when they are fried they become too brown, even when cooked under proper conditions. This is very undesirable in the manufacture of potato chips for market, as well as in preparing them for the home. If potatoes are stored at approximately 60° F. they develop the best frying qualities.

Soils and fertilizers, climatic conditions, and breeding, as well as storage conditions, all play an important part in the development of desirable cooking qualities in potatoes. The determination of these

facts is an important step toward the development of superior products. Such information is already being used in producing potatoes with special characteristics. The interesting results of studies of this type on potatoes should be the stimulus for similar projects to find out what makes for high quality in other vegetables.

Meat Tested for Palatability

Another study which has been under way for several years was set up to determine factors which influence the palatability of meat. This investigation is a cooperative project among the Bureaus of Home Economics, Animal Industry, and Agricultural Economics; 26 State agricultural experiment stations; and several other livestock and meat agencies. Animals are being produced under experimental conditions for the purpose of tracing the influence of such factors as breeding, sex, age, and feed on the meat when it is served. The food utilization section cooperates with the States in developing methods of cooking meat, cooks samples from experimental animals in preparation for palatability tests, and assists with the judging. As a part of this study 2,500 legs of lamb, 1,000 rib cuts of beef, and 600 pork roasts have been cooked and tested for palatability. The findings of this study are pointing the way to methods of obtaining high-quality meat as judged by palatability tests on the cooked product.

Thus the stepping-stone to better consumer information is through detailed investigations which are of primary concern to the producer. Many facts determined along the way can be immediately applied by the home maker. Practical information from the three projects just described has come out in the form of popular leaflets, as well as in radio talks, press releases, and magazine articles.

FLORANCE B. KING, *Bureau of Home Economics.*

LEISURE OF HOME MAKERS STUDIED FOR LIGHT ON STANDARDS OF LIVING

A family's standard of living is usually judged by the size of its income and the ways in which it spends its money. But the amount of leisure time which the members of the family enjoy and the ways in which they use this leisure are almost equally revealing.

It is the use of the home maker's time which tells most about the family's standard of living. For home makers differ more in regard to leisure than do the members of any other group in the population. They are more often sorely overworked, and more often unduly underworked, than are the men of the family or the other women. At one extreme is the wage-earning mother who combines a job outside of the home with caring for her family. And at the other end of the scale is the true "lady of leisure," who has nothing to do but give directions to a staff of paid workers. The great majority of home makers, of course, fall well within these two extremes. For them the day's work consists in doing their own housekeeping in their own homes. How much leisure time do these women have, and how do they use it?

Some light is thrown on this question by a study made by the Bureau of Home Economics of the use of time of 1,041 home makers living in different parts of the country. More than half of these women, 642, lived on farms, and 287 others were rural women living in the open country or in villages of less than 2,500 population. The remaining

facts is an important step toward the development of superior products. Such information is already being used in producing potatoes with special characteristics. The interesting results of studies of this type on potatoes should be the stimulus for similar projects to find out what makes for high quality in other vegetables.

Meat Tested for Palatability

Another study which has been under way for several years was set up to determine factors which influence the palatability of meat. This investigation is a cooperative project among the Bureaus of Home Economics, Animal Industry, and Agricultural Economics; 26 State agricultural experiment stations; and several other livestock and meat agencies. Animals are being produced under experimental conditions for the purpose of tracing the influence of such factors as breeding, sex, age, and feed on the meat when it is served. The food utilization section cooperates with the States in developing methods of cooking meat, cooks samples from experimental animals in preparation for palatability tests, and assists with the judging. As a part of this study 2,500 legs of lamb, 1,000 rib cuts of beef, and 600 pork roasts have been cooked and tested for palatability. The findings of this study are pointing the way to methods of obtaining high-quality meat as judged by palatability tests on the cooked product.

Thus the stepping-stone to better consumer information is through detailed investigations which are of primary concern to the producer. Many facts determined along the way can be immediately applied by the home maker. Practical information from the three projects just described has come out in the form of popular leaflets, as well as in radio talks, press releases, and magazine articles.

FLORANCE B. KING, *Bureau of Home Economics.*

LEISURE OF HOME MAKERS STUDIED FOR LIGHT ON STANDARDS OF LIVING

A family's standard of living is usually judged by the size of its income and the ways in which it spends its money. But the amount of leisure time which the members of the family enjoy and the ways in which they use this leisure are almost equally revealing.

It is the use of the home maker's time which tells most about the family's standard of living. For home makers differ more in regard to leisure than do the members of any other group in the population. They are more often sorely overworked, and more often unduly underworked, than are the men of the family or the other women. At one extreme is the wage-earning mother who combines a job outside of the home with caring for her family. And at the other end of the scale is the true "lady of leisure," who has nothing to do but give directions to a staff of paid workers. The great majority of home makers, of course, fall well within these two extremes. For them the day's work consists in doing their own housekeeping in their own homes. How much leisure time do these women have, and how do they use it?

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112 home makers lived in towns of less than 50,000 population. None of these women had full-time jobs outside of the home, and only a small proportion had any paid household help. Each home maker kept a detailed record of how she spent her time through the seven days of a week which was typical of her household life.

TABLE 14.—*Average daily distribution of time among various activities by 642 farm home makers, 287 other rural home makers, and 112 urban home makers in towns of from 2,500 to 50,000 population*

Kind of activity	Average time spent daily by—					
	Farm home makers		Other rural home makers		Urban home makers	
	H.	*m.*	*H.*	*m.*	*H.*	*m.*
Work:						
Home making	7	23	7	20	7	18
Farm work	1	19		27		04
Other work		05		14		09
Total	8	47	8	01	7	31
Personal needs:						
Sleep and rest	8	47	8	59	8	53
Eating meals	1	19	1	16	1	17
Dressing and other personal care		50		55	1	01
Total	10	56	11	10	11	11
Leisure:						
Informal social life	1	01	1	11	1	09
Reading		58	1	02	1	11
Meetings, study, church, community work		38		41		49
Other leisure activities		53	1	07	1	25
Transportation to and from home		26		29		29
Total	3	56	4	30	5	03
Actively not clearly reported		21		19		15
Entire day	24		24		24	

What do these records show as to the time these home makers spent in leisure activities? The answer depends, of course, on what is meant by leisure. If we consider it simply as the time not spent in work and in sleeping, eating, dressing, and other personal care, we find that the farm home makers had 3 hours 56 minutes a day of leisure, on the average, or 27 hours 32 minutes a week. For the other rural home makers, the average was 4 hours 30 minutes daily, and for the home makers living in towns, 5 hours 3 minutes.

Table 14 shows how this leisure time was distributed by each of these groups of home makers, and how the rest of the 24 hours of the day was used. The average size of family of the farm group was 4.4 persons, of the other rural group 4.1 persons, and of the urban group 4.

Similarity Among Groups

The most striking point shown by the table is the similarity between these groups of home makers. The time spent in housekeeping and care of the family is almost identical, averaging 7 hours 23 minutes daily for the farm women, 3 minutes less for the other rural women and 5 minutes less for the urban group. The chief difference appears in the time spent in farm work—that is, in the care of poultry and milk, in vegetable gardening, and in similar tasks. With the farm women these tasks required an average of 1 hour 19 minutes daily, while only 27 minutes was spent by the other rural women, and almost no time,

of course, by those living in towns. In each of the groups, a few minutes a day was given, on the average, to other kinds of work.

Because of their additional farm tasks, the farm home makers' working day was considerably longer than that of the town home makers, averaging 8¾ hours as compared with 7½ hours. For the other rural home makers the average fell at just 8 hours.

This extra time which the farm home makers spent in work accounts, of course, for their smaller amount of leisure. They show, to be sure, a few minutes less each day for sleep and rest and for other personal care, but the time given to personal needs differed surprisingly little for the three groups of women. All of them met the standard of 8 hours of sleep, with nearly an hour's leeway of additional rest. And all of them spent a little more than 2 hours a day in eating meals, dressing, and similar personal care. The time which remained out of the 24 hours of the day was what was left for leisure.

Is 4 to 5 hours a day a reasonable amount of leisure? Or to put the question in more familiar terms, is 7½ to 8¾ hours a day a reasonable amount of work?

At first glance the working days of these home makers seem to conform fairly closely to modern standards. But it must be remembered that the 8-hour day of industry applies to only a 6 or even a 5 day week, while the daily averages for these women cover the full 7 days of the week, Sunday included. In order to compare these figures with the working hours of other types of workers, we must consider the working week as a whole. For the farm group this amounted to 61½ hours on the average, and for the urban group to 52½ hours, with the other rural group intermediate.

Majority of Farm Women Overworked

Even these town housewives, therefore, have on the average a heavier working week than most industrial workers at the present time. And the majority of the farm women are appreciably overworked; almost three-fourths of them worked more than 56 hours a week, and one-fifth worked over 70 hours. These working hours, moreover, must be maintained with little leeway throughout the 52 weeks of the year. Unlike most occupations, home making does not usually include vacations or slack seasons, or even holidays. And the leisure which it does allow seldom leaves the home maker free from her job for more than a few hours at a time.

Turning to the ways in which these housewives used their leisure, the averages for the three groups are again surprisingly similar. About a fourth of the time was spent in reading, and another fourth in talking (visiting), playing cards, and similar informal recreation with other people. Around three-quarters of an hour a day, on the average, or five hours a week, went to attending meetings and classes, studying, going to church, and doing various kinds of church and community work. Going back and forth in connection with their leisure activities occupied approximately half an hour daily; and the remaining small amount of time had to suffice for all other kinds of recreation—attending movies, concerts, and entertainments, going to teas, dances, and similar social affairs, taking drives, listening to the radio, writing to friends, and myriad other interests. Clearly no one can claim that the home makers included in this study are frivoling away their time.

HILDEGARDE KNEELAND, *Bureau of Home Economics.*

FOOD-COMPOSITION DATA AID RESEARCH WORKERS TO INTERPRET FOOD STANDARDS

The home maker's problem of planning meals is not only a matter of providing what the family likes and can afford, but of providing at the same time foods that will furnish nutrients needed in a balanced diet. Not many home makers, however, have the time or inclination to study the abstract principles of nutrition. Most of them want to be certain that they get enough of the right kinds of foods, without being bothered with counting calories or estimating the protein and iron content of their diet. It remains for nutrition specialists, therefore, to figure out the food requirements for persons of different ages and to supply home makers with the necessary information in such convenient and familiar terms as bread, meat, fruits, vegetables, and milk, which go to make up the daily menu.

To do this it is necessary to know the composition of foods. Some are good sources of protein, some contain fats and carbohydrates, and others are valuable for their mineral content and their vitamins. Some contain much water, some are concentrated. Some contain indigestible material which does not count as food. In order to make possible the translation of body needs into terms of actual foods, the Bureau of Home Economics maintains a service which collects and analyzes all available information on composition of foods. This material is put out in the form of circulars made available to nutrition workers and teachers, in order that they may have accurate data as a basis for instruction on food selection.

The demand for information of this kind is increasing, judging by the inquiries the Bureau of Home Economics receives. Requests are frequent for data on the composition and fuel value of fresh fruits and vegetables not included in the usual tables in textbooks. Publications already issued contain data on the composition of these groups of food in so far as the protein, carbohydrate, fat, water, and total ash are concerned. These tables have been prepared after analyses from hundreds of soures have been collected, evaluated, reviewed, and summarized.

Work on Minerals Less Advanced

The work on minerals has not progressed so far, but the collection of calcium, phosphorus, and iron determinations in foods has already proved helpful to nutrition workers who are seeking data on the mineral content of certain food materials. One of the most urgent needs is information about the iron content of foods, because of the importance of iron in preventing and correcting certain types of anemia. After reviewing the available literature for data on iron in food materials, a list of foods that are especially rich in iron has been prepared and a chart is being issued for use in classrooms, lectures, and exhibits.

The results of these studies are made available to the general public through popular bulletins or news releases on foods or food selection. Publications of this type usually include some discussion of the nutritive value of particular foods or their place in the diet. Such discussion is based upon knowledge of food composition derived from chemical and biological studies. When the reader of a department news story or a bulletin on food for children is told that liver is a very nutritious food, or that leafy vegetables should be included in the diet frequently, he probably does not realize how much experimental work must be done in order to make such a simple dietary recommendation.

CHARLOTTE CHATFIELD, *Bureau of Home Economics.*

VITAMIN CONTENT OF MANY FOODS MEASURED BY TESTS WITH RATS

Foods may be grouped according to their importance as sources of energy, protein, or minerals. By selecting from these different groups it is possible to assure a reasonably balanced diet. There is another important factor to consider, however, that is, the vitamin content. What foods contain the different vitamins? And how much loss of vitamin content occurs in the preparation of those foods for use? To answer these questions, both for housewife and for dietitian, the nutrition laboratory of the Bureau of Home Economics is carrying on extensive investigations.

Earlier laboratory studies show that animals can not live on a diet of chemically pure foods. These studies led to the discovery of vitamins, substances present in small amounts in most of the natural foods. It is now known that there are at least six of these vitamins and that five are essential to the health of human beings. They seem to act as regulators of certain body processes and if any one of them is missing from the diet a characteristic diseased condition develops. Pellagra, for example, is the result of such a dietary deficiency. This disease may be corrected, as well as prevented, by including in the diet certain foods known to contain the pellagra-preventive factor.

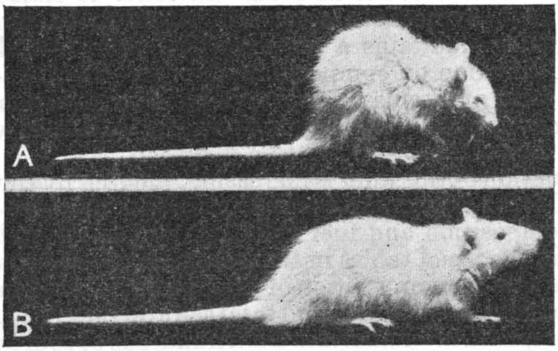

FIGURE 216.—A, Young rat as he appeared after two months on a diet lacking vitamin A; B, his brother, after receiving the same diet for six weeks, was then given butter as a source of vitamin A for two weeks. Photographs taken at the same time.

When a rat is deprived of vitamin A it soon stops growing and after several weeks, during which time it has become listless, thin, and anemic, the appearance of eye lesions is noted. These become progressively worse as time goes on. Sooner or later the animal dies, and autopsy reveals the presence of infection not apparent from observation of the live animal. Pus sacs are found in the glands of the tongue, mouth, and neck, as well as in the ears. If vitamin A is added to the diet of such an animal before the disease has progressed too far, i. e., before the tissues have been permanently injured, recovery is rapid and apparently complete. (Fig. 216.)

As soon as the importance of vitamins was discovered, chemists and nutritionists began to search out the foods containing them in most considerable quantities. Not until recently, however, have any of these factors been isolated in pure form so that they could be identified chemically. This meant that the usual chemical methods could not be used in measuring them and other methods had to be devised for this purpose.

Measuring Vitamin Values

It had been found that when an animal like the rat is kept on a diet that is deficient in one vitamin there is a quantitative relation between

the amount of that factor present and the rate of decline of the animal. Or conversely, if the animal has been kept on a deficient diet until the characteristic diseased condition has developed, and then is fed a food rich in the missing vitamin, the rate of recovery depends upon the amount of the vitamin in the added food. (Fig. 217.) By describing as a unit the amount of a vitamin that will produce a given effect in a "standardized" rat, it is possible to determine the relative vitamin values of any food that the rat will eat. We have such values for vitamin A and vitamin C, and a few for vitamin B. Some of those for the more common foods are given in Table 15.

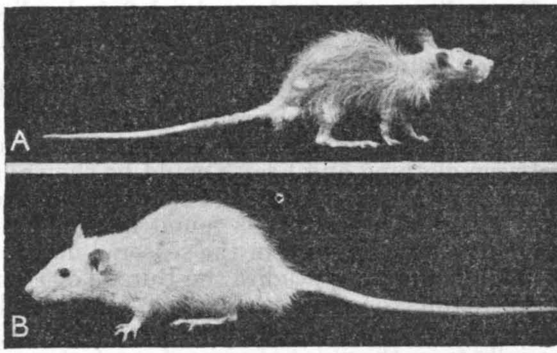

FIGURE 217.—A, Photograph of a young rat kept for 24 weeks on a diet lacking vitamin G; B, same rat six weeks later during which time it was given a diet rich in vitamin G

TABLE 15.—*Values of vitamins A and C in some common foods*

Edible portion	Units per ounce		Edible portion	Units per ounce	
	Vitamin A	Vitamin C		Vitamin A	Vitamin C
Apples	15	3	Liver	2,800	----
Bananas	100	5	Milk (whole)	65	1
Beans, string	150	5	Oranges	20	15
Cabbage	10	20	Peas, raw	175	15
Carrots	940	2	Peas, canned	175	10
Eggplant	20	2	Potatoes	10	3
Eggs	550	(1)	Sweetpotatoes	85	3
Escarole	6,000	3	Spinach	1,400	25
Grapes	20	2	Tomatoes	170	15
Lemons	(1)	15	Turnips	5	4
Lettuce	50	2			

1 Practically none.

As yet we can not say what are the body requirements for the different vitamins. One authority on nutrition says that an adult needs at least 4,500 units of vitamin A per 3,000 calories, while another designates 45 units of vitamin C as optimum. By reference to Table 15 it is easy to see how to calculate what foods to eat to supply the needed vitamin A (escarole, liver, spinach, carrots, and eggs head the list), or what may be used in place of orange juice to supply vitamin C (spinach, cabbage, tomatoes, lemons, fresh peas).

Information of this kind, as rapidly as it can be determined and brought together from all the laboratories now engaged in such researches, is being published in department circulars, news articles, and radio talks.

HAZEL E. MUNSELL, *Bureau of Home Economics.*

STANDARDS FOR CHILDREN'S CLOTHES STRESS COMFORT, SIMPLICITY, AND SELF-HELP

Expenditures for food can be definitely checked against standards set up in terms of the demands of good nutrition. There is no such check or guide for clothing expenditures. Unquestionably clothing choices have been largely determined by such human qualities as vanity, personal taste, and prejudice rather than comfort and health or even artistic design. It is believed that if a more definite relationship between clothing and health could be shown, some progress could be made in the establishment of fundamental clothing standards. The need for such standards is found in the size and fluctuation in the yearly clothing bill and in the seasonal nature of the industry.

In beginning such studies the Bureau of Home Economics disclaims any attempts to influence standards for adult clothing. It seemed possible, however, to make a start by a study of children's clothing, especially from the point of view of comfort, ease of care, and simplicity of design, applying the principles of modern psychology along with the working out of certain physical and physiological factors.

No satisfactory methods for furnishing definite data on the influence of clothing on health have been developed. Animals can not be used in these studies as they can in the study of nutrition. While it is known that the amount and kind of clothing influence heat regulation and probably the resistance to infection, definite facts are difficult to obtain. The collection of information on kinds and amounts of clothing recommended by physicians and nurses in close contact with children showed great diversity of recommendation. A study of the weight of clothing worn by children compared with similar data collected 10 years earlier gave definite evidence that the weight of clothes worn had decreased, probably in part as a result of better heating in homes and in part as a result of a different point of view on the amount of clothing required.

The development of nursery schools where groups of young children are brought together under similar conditions and under trained supervision, offered an opportunity for studies of the problem. Beginning with the evident requirements of comfort and lack of restriction, designs for children's clothing were worked out, and garments were made and tested by observation under normal, active conditions of wear.

The care of small children who require frequent change of garments, brought from the nursery-school attendants the suggestion that designs be developed that make it possible for the children to enter into this necessary activity at an earlier age. Interested as nursery-school workers are in the mental development of children as well as in their physical care, they saw in dressing and undressing an opportunity for coordination of mental and physical development which might well be utilized in child training. Based on these suggestions, a number of designs have been prepared and tested, from which definite recommendations have been made for sun suits, little girls' dresses, little boys' clothes, rompers, and outdoor play suits. These, at least, are a beginning toward setting standards which embody comfort, lack of constriction, and ease of care, for children's clothes.

These are to be followed as soon as more definite methods can be worked out, by studies to show the influence of certain physical characteristics of clothing on physiological reactions of the child.

LOUISE STANLEY, *Bureau of Home Economics.*

LAUNDRY TESTS UNDER SCIENTIFIC CONTROL SHOW HOW TO PREVENT DAMAGE

The average household has a considerable investment in its bed linen, table linen, and other fabrics that must be laundered. Therefore anything that can reduce or offset the wear and tear of the laundering process is an important home economy. The Bureau of Home Economics is conducting a series of tests and studies with different sheetings which have been manufactured from known grades of raw cotton under supervision of the Bureau of Agricultural Economics.

An obvious aim in such a project would be the prevention of scorch. It is easy to recognize damage by scorch when the iron has been hot enough to cause a stain. There may have been just enough heat, however, to cause a tendering of the fabric which is quite invisible. If this

FIGURE 218.—Household ironer with which fabrics can be ironed at a known temperature and pressure

occurs often, the fabric soon wears out. The experimental work thus far has developed a method of measuring the degree of scorch, as follows:

Before any fabric is ironed, the manufacturer's sizing or dressing is removed by the use of enzymes and a light washing process. Breaking-strength tests show that this treatment does not materially alter the mechanical properties of the cloth. All samples to be ironed are conditioned in a controlled humidity room, in which a relative humidity of 65 per cent is maintained. The moisture content of representative samples can then be carefully determined.

While the fabrics are being passed through the experimental ironer shown in the illustration (fig. 218), the temperature of the heated metallic shoe is obtained by an electrical device, in which the thermocouple replaces the ordinary mercury thermometer. The cloth being ironed is in contact with the heated metal under known pressure for about two and one-half seconds. The factors of time and pressure are

not varying here as in hand ironing, where they depend upon the operator. Uniform pressure conditions in the ironer can be maintained, however, only by careful attention to the contact between the metal shoe and the revolving roll. The latter takes the place of the board in hand ironing, and must be kept uniformly well padded.

The material used at present on the experimental ironer consists of two layers of regular knit cotton padding, two layers of napped, double-faced cotton felt, and a muslin cover. In actual service, only muslin which has been preshrunk can be used satisfactorily on account of the moisture absorption from the fabrics being ironed. The preshrunk knit cotton padding offered to the laundry trade would doubtless give an additional advantage.

Scorched Covers Should Be Changed

The covers need to be changed as soon as they develop even a slight indication of scorch. Fabrics ironed on scorched covers are liable to acquire yellow stains in the presence of moisture and the oxidized or burned cotton material. This is obvious in the yellow coloration taken on by hot water in which a moderately scorched cover has been allowed to stand for a short time. Any padding used with such covering should be well aired, as it has usually acquired an odor which is soon communicated to a fresh cover and to the materials that are being ironed. The padding of the ironer should be unrolled and fluffed up frequently to avoid any hard packing often occurring after continued service. While the roll should be uniformly firm, it should yield somewhat to the different materials that are being laundered.

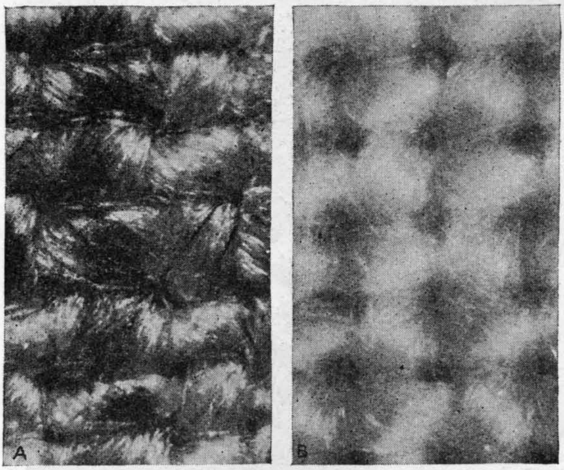

FIGURE 219.—Cotton-sheeting material treated with methylene blue solution, magnified 50 times: A, Scorched material; B, unscorched material

In this connection it should be noted that no one fabric will be absolutely uniform throughout in thickness or surface. This becomes more evident from the manner in which scorch effects have appeared on the fabric shown in the magnified illustration. (Fig. 219.) It will be apparent that in the case of a light scorch the fibers on the surface act as a protection to the yarns underneath. When they constitute the only scorched part of the fabric, the breaking strength of the cloth is not noticeably changed. This is particularly evident in heavy, thick sheetings ironed under low pressure at a comparatively high temperature.

The yarns illustrated in Figure 220 were taken from other parts of the fabrics shown in Figure 219. In order to make the scorched condition more visible, the fabrics were treated with a solution of methylene blue dye. The comparative resistance of the unscorched fabric to

this treatment may be seen in Figure 219, B. This fact is made use of, but with a different procedure, in a quantitative method of estimating chemical damage in the ironed cloth.

The weakening of the fibers taken from a scorched yarn is well illustrated in Figure 221. Both the unscorched fiber and the scorched were treated with the same chemical solution (Fleming and Thaysen solution). The comparative degradation of the scorched fiber is plainly evident.

In this study of ironed fabrics various methods are being used for detecting chemical change. The viscosity determination is one of the most satisfactory of these methods. In this test the ironed sample is ground and dissolved in a cuprammonium solution. The time rate of flow of this cotton solution in an accurately measured, fine tube is then obtained. The more tendered the cloth sample, the more rapid will be the flow of the solution through the tube.

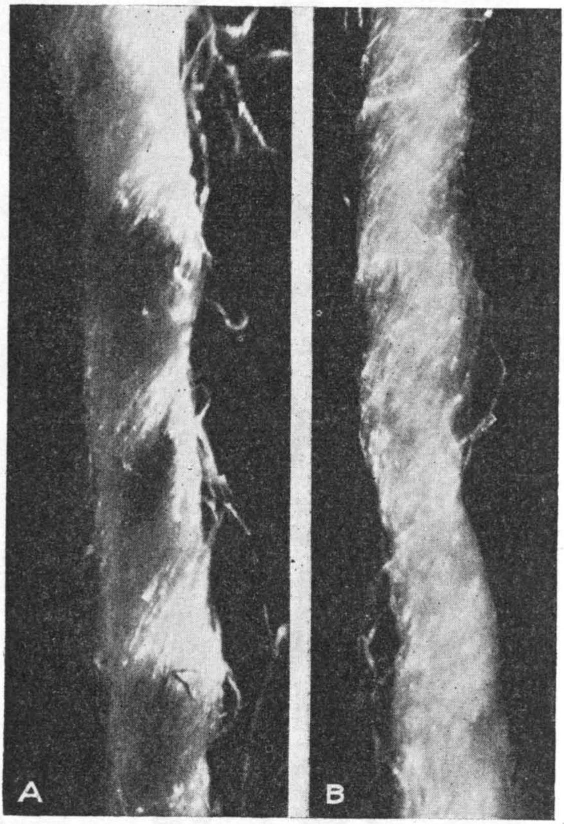

FIGURE 220.—Cotton yarns from sheeting material which have been treated with methylene blue solution: A, Scorched yarn; B, unscorched yarn

Color Measurements of Surface Changes

When the mechanical and the chemical damage appear very slight, color measurements are employed to detect certain surface changes. A scorched condition is indicated by the smaller amount of violet light reflected from the sample. By a modified spectrophotometric method, determinations of the light reflected from the cloth are made for definite regions in the red, in the yellow, in the green, in the blue, and in the violet. While a deep scorch will obviously lessen the total amount of light reflected from a fabric, a faint scorch in a sample will be evident mainly from the smaller amount of blue-violet light reflected.

Observations made on the ironer when it is set for a pressure of from 1 to 1½ pounds to the square inch, show changes in certain 4-ounce sheetings for temperatures as low as 473° F. The surface of the roll just before it touches the hot metal is then at a temperature of from 99° to 104° (slightly warm to the hand). If the roll is allowed to turn against the heated surface so that its surface temperature is slightly

more than doubled, these same sheetings may be affected at a temperature about 45° lower. The first measurement described with the cooler roll is doubtless more comparable with hand ironing. It is of interest to note here that under service conditions for a period of time,

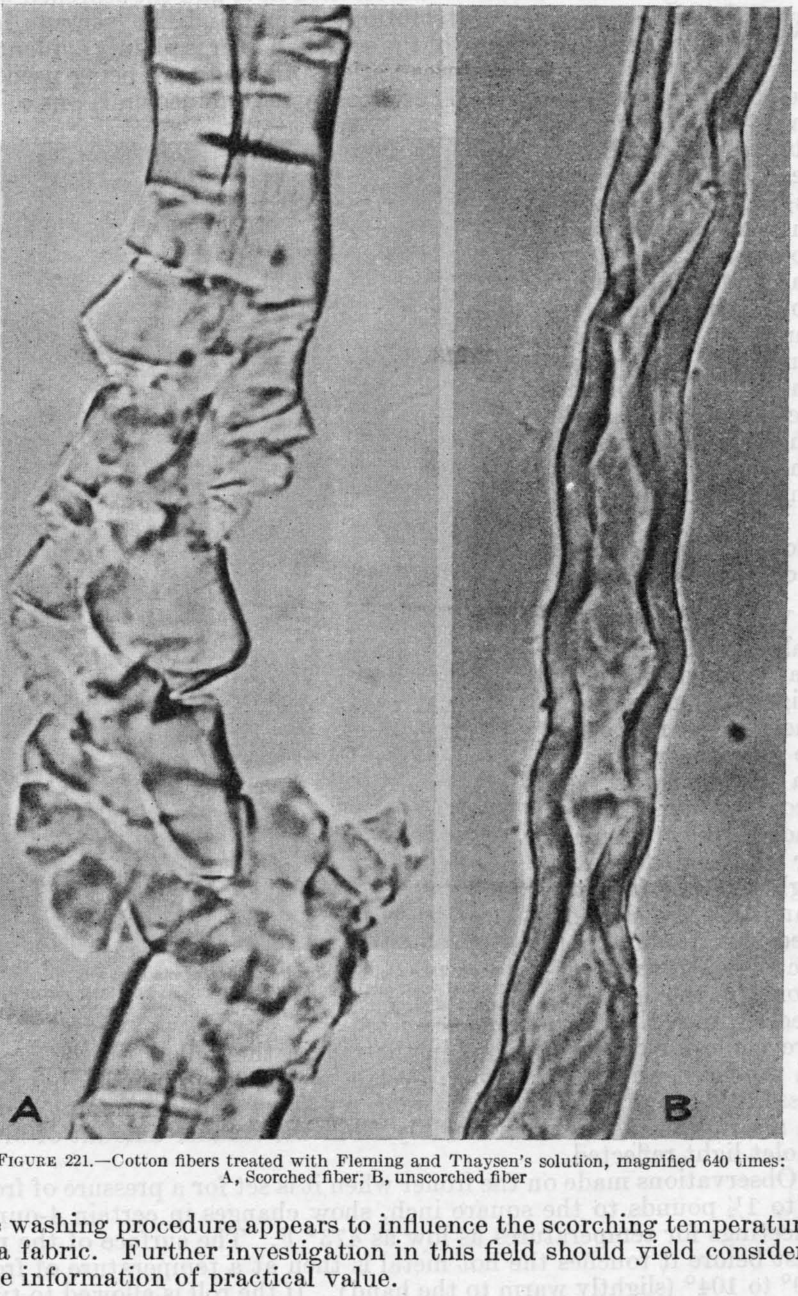

FIGURE 221.—Cotton fibers treated with Fleming and Thaysen's solution, magnified 640 times: A, Scorched fiber; B, unscorched fiber

the washing procedure appears to influence the scorching temperature of a fabric. Further investigation in this field should yield considerable information of practical value.

K. MELVINA DOWNEY, *Bureau of Home Economics.*

AGRICULTURAL STATISTICS

Prepared under the direction of the Statistical Committee: Joseph A. Becker, chairman, Lewis B. Flohr, secretary, S. W. Mendum, L. M. Davis, E. J. Working, and B. C. Boree.

In the interests of economy, many tables formerly regularly included in this section of the Yearbook are omitted this year and the number of years has been reduced for many series. Recent data for the omitted tables are for the most part available in current publications and can be supplied upon direct request. For data for earlier years not covered in this Yearbook, the user is referred to past issues.

The statistical section of this Yearbook brings together what seem from experience to be the most important agricultural statistics for the United States, and for the world so far as the agriculture of this country is concerned. Historical and geographical series have been given.

For greater detail on individual commodities than can be shown in the Yearbook, the Statistical Bulletin series of the department may be consulted.

For current statistics to supplement Yearbook statistics, the following sources should be used: (1) Crops and Markets—a monthly publication of the department carrying the latest current statistics on agriculture in the United States; (2) Foreign Crops and Markets—issued weekly by the Bureau of Agricultural Economics and devoted to current world statistics of crops, livestock, and markets; (3) foreign commodity news—published by the Bureau of Agricultural Economics and showing the latest world information on single commodities and released as important information is received; (4) market news reports of the Bureau of Agricultural Economics—issued daily, weekly, monthly, quarterly, or at irregular intervals, at Washington and at the principal markets.

The crop and livestock reporting service estimates acreage, condition of crop, yield per acre, production, and farm prices of crops, and numbers, production, farm prices, and values of livestock and livestock products. The organization of this work outside of the crop-reporting board and the office force in Washington consists of 41 State field offices, each with an agricultural statistician in charge. There is one field office for the New England States, one for Maryland and Delaware, and one for Utah and Nevada.

Acreages for the year 1909 are as reported by the Bureau of the Census; acreages in 1919, 1924, and 1929 are based upon the census supplemented by State enumerations. In the intercensal years, from 1910 to 1915, estimated acreages were obtained by applying estimated percentages of decrease or increase to the published acreage in the preceding year. The estimates from 1916 to 1918, 1920 to 1923, 1925 to 1928, 1930, and 1931 are based upon acreage changes from year to year as shown by a sample of over 2 per cent of the crop acreages in each year, supplemented by State enumerations. Yields per acre are estimates based upon reports of one or more farmers in each agricultural township on the average yield per acre in their localities. For 1929, 1930, and 1931 these reports have been adjusted to be comparable with yields derived from the 1929 census. For certain crops, yields from 1919 to 1928 have been adjusted to be comparable with the census yields of 1919, 1924, and 1929. For these same crops, revisions of acreage have been made for the period 1919 to 1928 essentially to the acreages reported by the censuses of 1919 and 1929. Production is acreage times yield per acre.

Estimates of farm stocks, sales, quality, crop condition, and miscellaneous information concerning crops are based either upon sample data or upon estimates of crop reporters for their localities.

The term "commercial" is used in connection with certain crop estimates to distinguish some part of the total production of a crop. Except for indicating that the entire production is not represented in the estimate, "commercial" does not have the same meaning in each instance where used. The commercial apple estimate, for example, represents that portion of the total apple crop which is sold or available for sale for consumption as fresh fruit. That portion of the crop which is used for cider, vinegar, canning, evaporating, or other manufacture is not included in the commercial estimate as defined in this case. The commercial orange and grapefruit crops in Florida represent the portion shipped or to be shipped as differentiated from the portion canned, juiced, sold, or consumed locally, wasted, etc. Until recently, cherry estimates represented the commercial sales in certain States and included only the quantities shipped to market or utilized by canners, cold packers, and other processors. The estimates now include the total production in these commercially important States. Estimates of commercial truck-crop production are concerned only with those areas growing the crops primarily to supply the large consuming markets more or less distant from the producing center. Production in home and market gardens, intended principally for local sale, is excluded. Similarly with truck crops grown for commercial canning or manufacture the estimates include only amounts grown for use by canning or packing establishments and exclude amounts canned in the home. The truck and canning crop estimates are designed to include the total quantity produced on the commercial acreage in the areas concerned, whether or not the entire crop finds a market or a use.

Monthly estimated prices received by producers on the specified dates are based upon reports from special price reporters, who are mostly country dealers, on the average price paid to farmers and do not relate to any specified grade.

Farm values of crops as shown are mostly computed by applying the December 1 farm price to the total production. These prices are reported by the crop reporters, who are mostly farmers. The average price received for the portion of the crop sold may be greater or less than this price, depending upon the prices previous and subsequent to December 1, and the amount of the crop sold at the different prices. For commercial truck and canning crops, and for certain fruit crops, the prices shown are the estimated seasonal averages of the prices received by growers at the shipping point, the cost of the container included if a customary requirement of delivery.

Numbers of livestock on farms on January 1, 1920, and 1925, are based upon the census enumeration as of that date, supplemented by enumerations by State agencies, such as assessors and brand inspection boards, and by records of shipments during 1920 and 1925. Numbers on January 1, 1930, give weight in so far as feasible to the numbers reported by the census of 1930 which was as of April 1, with allowance for indicated changes between January 1 and April 1. In the intercensal years, from 1911 to 1916, the numbers of livestock were obtained by methods identical with those used for crop acreages. Estimates from 1917 to 1919, from 1921 to 1924, from 1926 to 1930, for 1931 and 1932 are based upon a sample of over 2 per cent, supplemented by trends derived from assessors' enumberations, reports of brand inspection boards, market movements, and stockyard receipts. The census bases are not always comparable from one decade to another, because of changes of dates and classifications.

The average value per head on January 1 is estimated from reports of correspondents relating to livestock in their vicinity. These tend to reflect inventory values as distinguished from the monthly prices which relate to sales. The farm value on January 1 is computed by applying the average value per head to the number on farms.

The Federal market news service supplies much of the information on market prices and movements. The leased-wire system in use by the service extends from the Atlantic to the Pacific and reaches most of the important markets of the country. At each of the branch offices commodity specialists gather information regarding the supply, the demand, and prices for the products on which they report. They observe the sales actually made on the markets and are constantly in touch with the traders, who in many instances give them access to their office records in order that they may have specific information on which to base their reports. Car-lot shipments and market receipts of crops and livestock products are reported by officials and agents of railroads, express companies, and boat

lines, or compiled from trade publications. At markets where shipments by automobile truck have become of increasing importance, receipts by truck are reported by dealers and distributors. Data on receipts, slaughter, and shipments of livestock are obtained from monthly reports submitted by the public stockyards. Data on cold-storage stocks are obtained directly from all important cold-storage warehouses, and data on commercial stocks of grain are reported by boards of trade, etc. Leaf-tobacco stocks are reported directly by dealers and manufacturers.

Where a weighting factor is available market prices as shown are weighted averages; but in many cases a weighting factor is not available, and the prices shown are usually the means of ranges of quotations without reference to quantity. The weighted market prices of grain are based on the number of carload sales reported. The weighted average price of hogs at Chicago is based on total sales of butcher and packer hogs to slaughterers.

Prices derived from different sources may not be strictly comparable, although for most general purposes they are satisfactory. The data as to commercial stocks and movements of various commodities are as nearly complete as practicable and feasible, and are considered fairly representative.

The statistics of grain grading are based on work done by licensed grain inspectors located throughout the United States.

Statistics of acreage and production in foreign countries are compiled as far as possible from official sources and are therefore subject to whatever errors may result from shortcomings in the reporting and statistical services of the various countries. Inaccuracies also result from differences in nomenclature and classification in foreign countries. Except where otherwise stated, pre-war data refer to pre-war boundaries. Yields per acre are calculated from acreage and production, both rounded to thousand units, and are therefore subject to a greater possibility of error when calculated for countries with small acreage.

The tables of international trade cover substantially the international trade of the world. The total imports and the total exports in any one year can not be expected to balance, although disagreements tend to be compensated over a series of years. Among the sources of disagreement are: The different periods covered by the "year" of various countries; imports received in the year subsequent to the year of export; lack of uniformity in classification of goods as among countries; different trade practices and varying degrees of failure in recording countries of origin and ultimate destinations; different practices in recording reexported goods; and different methods of treating free ports. The exports given are domestic exports and the imports given are imports for consumption whenever it is possible to distinguish such imports from general imports, that is, "special" or net instead of general. General imports are all imports reported. In foreign countries "special" trade is imports for consumption, or net imports, or imports less reexports. In the United States imports for consumption are those entered for actual consumption and include withdrawals from warehouse for consumption. Special or net figures are used in the international trade tables for the following countries: Belgium, Denmark, Egypt, Irish Free State, China, Dutch East Indies, France, and United Kingdom. In the United States trade tables and wherever United States figures are given, they are domestic exports and general imports unless otherwise specified. While there are some inevitable omissions, there may be some duplication because of reshipments which do not appear as such in the official reports. In the trade tables, figures for the United States include Alaska, Porto Rico, and Hawaii, but not the Philippine Islands.

As an aid to the comprehension and use of these statistics, the following table of weights, measures, and conversion factors will be useful:

Weights, measures, and conversion factors used in the Department of Agriculture

Commodity	Unit [1]	Weight in pounds	Commodity	Unit [1]	Weight in pounds
Alfalfa seed	Bushel	60	Peanut oil	Gallon	7.5
Apricots	do	48	Potatoes	Bushel	60
Barley	do	48	Rapeseed	do	50
Beans, dry	do	60	Rice, rough	do	45
Buckwheat	do	48	Rice, cleaned	do	60
Clover seed	do	60	Rye	do	56
Corn, shelled	do	56	Rye flour	Barrel	196
Corn, ear, husked	do	70	Soybean oil	Gallon	7.5
Cotton, ginned	Bale	[2] 478; [3] 500	Spelt	Bushel	40
			Timothy seed	do	45
Cottonseed oil	Gallon	7.5	Tomatoes	do	56
Cranberries	Barrel	100	Wheat	do	60
Flaxseed	Bushel	56	Wheat flour	Barrel	196
Grapefruit	Box	[2] 70	Almonds, apricots, asparagus, snap beans, beet sugar, broomcorn, cabbage, cane sugar, cottonseed, figs, grapes, hay, plums, prunes, raisins, sugar, sugar beets, sugar cane, walnuts	Short ton	2,000
Hempseed	Bushel	44			
Lemons	Box	[2] 74			
Milk	Gallon	8.6			
Oats	Bushel	32			
Oranges (California)	Box	[2] 70			
Oranges (Florida)	do	[2] 80			
Orchard grass	Bushel	14			

Commodity	Equivalents
Almonds	1 pound shelled is equivalent to about 3⅓ pounds unshelled.
Apples	1 pound dried is equivalent to about 5 pounds of fresh.
Barley flour	1 barrel (196 pounds) is equivalent to about 9 bushels of barley.
Buckwheat flour	1 barrel (196 pounds) is equivalent to about 7 bushels of buckwheat.
Filberts	1 pound shelled is equivalent to about 2.22 pounds unshelled.
Malt	1.1 bushel (34 pounds) is equivalent to about 1 bushel of barley.
Oatmeal	1 barrel (196 pounds) is equivalent to about 10�8 bushels of oats.
Do	18 pounds is equivalent to about 1 bushel of oats.
Peanuts	1 pound shelled is equivalent to about 1½ pounds unshelled.
Peaches (California)	1 pound dried is equivalent to about 5½ pounds fresh.
Prunes	1 pound dried is equivalent to about 2½ pounds fresh.
Rye flour	1 barrel (196 pounds) is equivalent to about 6 bushels of rye.
Raisins	1 pound is equivalent to about 4 pounds of grapes.
Wheat flour	1 barrel (196 pounds) is equivalent to about 4.7 bushels of wheat.[4]
Walnuts (English)	1 pound shelled is equivalent to about 2.38 pounds unshelled.

[1] Standard bushel used in the United States contains 2,150.42 cubic inches; the gallon, 231 cubic inches.
[2] Net.
[3] Gross.
[4] Due to changes in milling processes, equivalents have varied as follows: 1790–1879, 5; 1880–1908, 4.75; 1909–1917, 4.7; 1918–1919, 4.5; 1920, 4.6; 1921–1931, 4.7.

STATISTICS OF GRAINS

TABLE 1.—*Wheat, all: Acreage, production, value, exports, etc., United States, 1849, 1859, 1866–1931*

Year	Acreage harvested	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Spring wheat, price per bushel at Chicago, year beginning July [1]	No. 2 red winter wheat, price per bushel at Chicago, year beginning July [2]	Foreign trade, including flour, year beginning July [3]			
								Domestic exports [4]	Imports [5]	Net exports [6]	
										Total	Percentage of production
	1,000 acres	*Bush.*	*1,000 bushels*	*Cts.*	*1,000 dolls.*	*Cts.*	*Cts.*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*Per cent*
1849			*100,486*			66		7,536	2,913	5,701	5.7
1859			*173,105*			90	82	17,213	[7] 4,493	[7] 12.720	7.3
1866	15,424	9.9	152,000	152.7	232,110	219	94	12,647	3,093	10,828	7.1
1867	18,322	11.6	212,441	145.2	308,387	198	145	26,323	2,014	24,550	11.6
1868	18,460	12.1	224,037	108.5	243,033	134	123	29,717	1,830	28,314	12.6
1869			*287,746*								
1869	19,181	13.6	260,147	76.5	199,025	98	84	53,901	1,286	53,126	20.4
1870	18,993	12.4	235,885	94.4	222,767	116	84	52,574	867	52,195	22.1
1871	19,944	11.6	230,722	114.5	264,076	124	109	38,996	2,411	37,587	16.3
1872	20,858	12.0	249,997	111.4	278,522	121	111	52,015	1,841	50,705	20.3
1873	22,172	12.7	281,255	106.9	300,670	116	103	91,510	2,117	90,418	32.1
1874	24,967	12.3	308,103	86.3	265,881	95	98	72,913	368	72,845	23.6
1875	26,382	11.1	292,136	89.5	261,397	106	86	74,751	1,664	74,508	25.5
1876	27,627	10.5	289,356	97.0	280,743	122	92	57,044	366	57,148	19.8
1877	26,278	13.9	364,194	105.7	385,089	111	121	92,142	1,391	92,028	25.3
1878	32,109	13.1	420,122	77.6	325,814	90	95	150,503	2,074	150,253	35.8
1879	*35,430*	*13.0*	*459,483*								
1879	35,430	14.1	499,893	110.6	552,884	110	99	181,807	487	181,951	36.4
1880	37,987	13.1	498,550	95.1	474,202	100	105	188,308	212	188,250	37.8
1881	37,709	10.2	383,280	119.2	456,880	128	115	123,371	867	123,211	32.1
1882	37,067	13.6	504,185	88.4	445,602	105	118	150,113	1,088	150,000	29.8
1883	36,456	11.6	421,086	91.1	383,649	93	102	113,822	33	113,892	27.0
1884	39,476	13.0	512,765	64.5	330,862	79	83	135,232	213	135,301	26.4
1885	34,189	10.4	357,112	77.1	275,320	81	88	96,611	389	96,569	27.0
1886	36,806	12.4	457,218	68.7	314,226	77	76	156,685	283	156,760	34.3
1887	37,642	12.1	456,329	68.1	310,613	75	75	122,616	596	122,524	26.8
1888	37,336	11.1	415,868	92.6	385,248	95	88	90,944	136	91,030	21.9
1889	*33,580*	*13.9*	*468,374*								
1889	33,580	12.9	434,383	69.5	301,869	81	86	112,488	163	112,507	25.9
1890	34,048	11.1	378,097	83.3	315,112	97	89	109,017	586	109,054	28.8
1891	37,826	11.5	584,504	83.4	487,463	89	96	229,465	2,463	228,841	39.2
1892	39,552	13.3	527,987	62.2	328,331	73	78	196,068	968	195,672	37.1
1893	37,934	11.3	427,553	53.5	228,599	60	68	168,498	1,183	167,531	39.2
1894	39,425	13.1	516,485	48.9	252,709	57	57	148,630	1,439	147,740	28.6

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board; italic figures are census returns.

[1] Spring wheat prices compiled as follows: 1849–1870, from Chicago newspapers, quoted; 1849, spring wheat, contract grade; 1859, standard spring, contract grade; 1866–1870, No. 1 spring, contract grade; 1871–1884, annual reports of Chicago Board of Trade, quoted as No. 2 spring, contract grade; 1885–1896, Bartel's Red Book, quoted as No. 2 spring; January, 1897–June, 1904, Chicago Daily Trade Bulletin, average of daily ranges; quotations used; January–October, 1897, No. 3 spring; November, 1897–June, 1898, No. 3 spring, hard varieties; July, 1898–June, 1904, No. 1 spring; from February, 1897, "free on board" was used when available; July, 1904–December, 1918, Bartel's Red Book, average of daily ranges, quoted as No. 1 northern. Subsequently from the Chicago Daily Trade Bulletin and are averages of the daily cash price per bushel weighted by car-lot sales.

[2] Prices, 1839–1898, are from the Price Current Grain Reporter 1924 Yearbook, p. 4, and are average cash prices for calendar years; subsequently from the Chicago Daily Trade Bulletin and are averages of the daily cash price per bushel weighted by car-lot sales.

[3] Compiled from Commerce and Navigation of the United States, 1849, 1859, 1866–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1926; January and June issues, 1927–1931. Wheat flour converted to terms of grain on the following basis: 1849, 1859, 1866–1879, 1 barrel is the product of 5 bushels of grain; 1880–1908, 4.75; 1909–1917, 4.7; 1918–19, 4.5; 1920, 4.6; 1921–1931, 4.7.

[4] Includes flour milled from imported wheat.

[5] Includes wheat imported for milling in bond and export.

[6] Total exports (domestic plus foreign) minus total imports.

[7] Imports of flour estimated.

TABLE 1.—*Wheat, all: Acreage, production, value, exports, etc., United States, 1849, 1859, 1866–1931*—Continued

Year	Acreage harvested	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Spring wheat, price per bushel at Chicago, year beginning July	No. 2 red winter wheat, price per bushel at Chicago, year beginning July	Foreign trade, including flour, year beginning July: Domestic exports	Foreign trade: Imports	Foreign trade: Net exports: Total	Foreign trade: Net exports: Percentage of production
	1,000 acres	*Bush.*	*1,000 bushels*	*Cts.*	*1,000 dolls.*	*Cts.*	*Cts.*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*Per cent*
1895	40, 848	13. 9	569, 456	50. 3	286, 539	61	62	130, 099	2, 117	130, 345	22. 9
1896	43, 916	12. 4	544, 193	71. 7	390, 346	70	67	148, 767	1, 545	148, 725	27. 3
1897	46, 046	13. 3	610, 254	80. 9	493, 683	91	86	221, 143	2, 060	220, 965	36. 2
1898	51, 007	15. 1	772, 163	58. 2	449, 022	71	90	227, 240	1, 875	227, 300	29. 4
1899	*52, 589*	*12. 5*	*658, 534*								
1899	52, 589	12. 1	636, 051	58. 6	372, 982	70	[8] 72	190, 772	320	190, 749	30. 0
1900	51, 387	11. 7	602, 708	62. 0	373, 578	75	76	220, 653	603	220, 723	36. 6
1901	52, 473	15. 0	788, 638	62. 6	493, 766	74	72	239, 212	121	239, 137	30. 3
1902	49, 649	14. 6	724, 808	63. 0	456, 851	77	75	207, 835	1, 080	208, 016	28. 7
1903	51, 632	12. 9	663, 923	69. 5	461, 439	90	83	124, 977	229	124, 926	18. 8
1904	47, 825	12. 5	596, 911	92. 4	551, 788	114	[9] 100	46, 319	3, 296	43, 612	7. 3
1905	49, 389	14. 7	726, 819	74. 6	542, 543	89	[8] 88	101, 089	273	100, 849	13. 9
1906	47, 800	15. 8	756, 775	66. 2	501, 316	84	77	150, 597	602	150, 594	19. 9
1907	45, 116	14. 1	637, 981	86. 5	552, 074	107	90	166, 525	530	166, 304	26. 1
1908	45, 970	14. 0	644, 656	92. 2	594, 128	116	96	116, 373	475	115, 901	18. 0
1909	*44, 263*	*15. 4*	*683, 379*								
1909	44, 262	15. 8	700, 434	98. 4	689, 108	114	110	89, 173	845	88, 465	12. 6
1910	45, 681	13. 9	635, 121	88. 3	561, 051	107	102	71, 338	1, 175	70, 164	11. 0
1911	49, 543	12. 5	621, 338	87. 4	543, 063	110	90	81, 891	3, 445	78, 447	12. 6
1912	45, 814	15. 9	730, 267	76. 0	555, 280	94	103	145, 159	1, 304	143, 938	19. 7
1913	50, 184	15. 2	763, 380	79. 9	610, 122	93	88	147, 955	2, 402	146, 306	19. 2
1914	53, 541	16. 6	891, 017	98. 6	878, 680	132	108	335, 702	728	335, 162	37. 6
1915	60, 469	17. 0	1, 025, 801	91. 9	942, 303	120	113	246, 221	7, 254	239, 591	23. 4
1916	52, 316	12. 2	636, 318	160. 3	1, 019, 968	196	168	205, 962	24, 960	181, 067	28. 5
1917	45, 089	14. 1	636, 655	200. 8	1, 278, 112	227	225	132, 579	31, 215	102, 775	16. 1
1918	59, 181	15. 6	921, 438	204. 2	1, 881, 826	234	222	287, 402	11, 289	276, 615	30. 0
1919	*73, 099*	*12. 9*	*945, 403*								
1919	75, 694	12. 8	967, 979	214. 9	2, 080, 056	276	224	222, 030	5, 511	216, 671	22. 4
1920	61, 143	13. 6	833, 027	143. 7	1, 197, 263	198	223	369, 313	57, 682	312, 625	37. 5
1921	63, 696	12. 8	814, 905	92. 6	754, 834	136	125	282, 566	17, 375	265, 590	32. 6
1922	62, 317	13. 9	867, 598	100. 7	873, 412	122	114	224, 900	20, 031	205, 079	23. 6
1923	59, 659	13. 4	797, 394	92. 3	736, 006	119	102	159, 880	28, 079	131, 892	16. 5
1924	*50, 862*	*15. 7*	*800, 877*								
1924	52, 535	16. 5	864, 428	129. 9	1, 123, 086	155	158	260, 803	6, 201	254, 695	29. 5
1925	52, 367	12. 9	676, 765	141. 6	958, 364	166	164	108, 035	15, 679	92, 669	13. 7
1926	56, 359	14. 8	831, 381	119. 8	996, 308	140	138	219, 160	13, 264	205, 994	24. 8
1927	58, 784	14. 9	878, 374	111. 5	979, 813	140	140	206, 259	15, 734	190, 578	21. 7
1928	58, 272	15. 7	914, 876	97. 0	887, 184	118	138	163, 687	21, 442	142, 301	15. 6
1929	62, 671	13. 0	812, 573	103. 5	841, 385	127	130	153, 245	12, 956	140, 361	17. 3
1930	61, 138	14. 0	858, 160	60. 0	514, 847	84	86	131, 536	19, 059	112, 496	13. 1
1931 [10]	54, 949	16. 2	892, 271	44. 3	395, 600						

[8] Weighted average for 11 months.
[9] Weighted average for 10 months.
[10] Preliminary.

TABLE 2.—*Wheat, winter and spring: Acreage sown and harvested, and production, United States, 1910–1931*

Year	Winter wheat				Durum wheat			Other spring wheat		
	Acreage sown in preceding fall	Acreage harvested	Average yield per acre	Production	Acreage harvested	Average yield per acre	Production	Acreage harvested	Average yield per acre	Production
	1,000 acres	*1,000 acres*	*Bushels*	*1,000 bushels*	*1,000 acres*	*Bushels*	*1,000 bushels*	*1,000 acres*	*Bushels*	*1,000 bushels*
1910	31,659	27,329	15.9	434,142						
1911	32,648	29,162	14.8	430,656						
1912	33,229	26,571	15.1	399,919						
1913	33,274	31,699	16.5	523,561						
1914	37,158	36,008	19.0	684,990						
1915	42,431	41,308	16.3	673,947						
1916	39,245	34,709	13.8	480,553						
1917	38,359	27,257	15.1	412,901	2,396	10.9	26,009	15,436	12.8	197,745
1918	43,126	37,130	15.2	565,099	3,313	15.2	50,235	18,738	16.3	306,104
1919	51,483	50,494	15.1	760,377	3,782	8.2	30,996	21,418	8.2	176,606
1920	44,861	40,016	15.3	610,597	4,409	10.9	48,200	16,718	10.4	174,230
1921	45,625	43,414	13.8	600,316	5,276	10.1	53,324	15,006	10.7	161,265
1922	47,930	42,358	13.8	586,878	5,792	15.1	87,669	14,167	13.6	193,051
1923	46,091	39,508	14.5	571,777	5,295	10.0	52,834	14,856	11.6	172,783
1924	38,916	35,656	16.6	592,259	3,826	16.3	62,373	13,053	16.1	209,796
1925	39,951	31,346	12.8	402,070	4,280	14.4	61,651	16,741	12.7	213,044
1926	39,887	36,987	17.0	627,433	4,774	9.2	43,981	14,598	11.0	159,967
1927	43,373	37,723	14.7	552,747	5,484	14.4	79,100	15,577	15.8	246,527
1928	47,317	36,213	16.0	578,673	6,836	14.2	97,291	15,223	15.7	238,912
1929	43,340	40,580	14.2	577,009	5,571	9.8	54,710	16,520	10.9	180,854
1930	43,630	39,509	15.2	601,840	4,745	12.2	57,719	16,884	11.8	198,601
1931 [1]	43,149	41,009	19.2	787,465	2,869	6.4	18,395	11,071	7.8	86,411

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.

TABLE 3.—*Winter wheat: Percentage of acreage abandoned, average 1919–1928, annual 1927–1931* [1]

State	Average, 1919–1928	1927	1928	1929	1930	1931	State	Average, 1919–1928	1927	1928	1929	1930	1931
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
N. Y	3.1	1.0	6.0	2.0	8.0	0.5	Ky	13.8	3.0	65.0	3.0	3.5	3.0
N. J	3.4	1.0	5.0	1.0	1.0	0.5	Tenn	7.7	5.0	28.0	4.0	4.0	1.5
Pa	2.8	2.5	9.0	1.0	2.5	4.0	Ala	8.5	10.0	15.0	3.0	4.0	1.0
Ohio	13.2	3.0	64.0	1.0	15.0	1.0	Miss	21.7	10.0	40.0			
Ind	11.0	3.0	60.0	4.0	7.0	1.0	Ark	8.7	20.0	30.0	10.0	5.0	2.5
Ill	11.7	5.5	62.0	8.0	9.0	0.5	Okla	9.5	20.0	7.0	6.0	14.0	4.5
Mich	3.6	2.0	10.0	1.5	3.0	1.5	Tex	16.4	24.0	23.0	7.0	16.0	4.5
Wis	11.2	2.5	32.0	2.0	5.0	4.0	Mont	26.8	12.0	18.0	15.0	23.8	50.0
Minn	11.8	2.0	45.0	3.5	8.0	3.0	Idaho	6.4	4.0	5.0	3.0	4.0	4.0
Iowa	5.5	2.5	22.0	3.0	1.9	3.5	Wyo	10.0	12.0	10.0	12.0	15.0	22.0
Mo	7.9	11.0	32.0	4.0	7.0	1.0	Colo	21.9	30.0	40.0	20.0	24.0	15.0
S. Dak	17.6	10.0	40.0	5.0	5.0	25.0	N. Mex	36.7	89.0	45.0	20.0	52.0	2.0
Nebr	9.0	4.0	10.0	9.0	2.5	4.5	Ariz	5.0	1.0	1.0	2.0	2.1	0
Kans	13.9	20.0	15.2	5.0	5.0	2.0	Utah	3.4	3.0	2.0	2.5	3.0	5.0
Del	2.4	1.0	1.0	1.0	1.0	5.0	Nev	3.3	0	1.0	1.5	0	0
Md	2.3	1.5	3.0	1.5	1.5	6.0	Wash	14.8	6.0	6.0	10.0	28.0	4.0
Va	2.7	2.0	6.0	1.5	1.3	2.0	Oreg	9.2	1.0	3.0	3.0	5.0	5.0
W. Va	4.6	1.5	15.0	1.5	1.0	2.5	Calif	16.8	3.0	9.0	20.0	10.0	38.0
N. C	2.7	3.0	7.0	2.0	4.5	1.5							
S. C	4.8	6.0	12.0	5.0	4.0	2.0	U. S	11.7	13.0	23.5	6.4	9.4	5.0
Ga	10.2	8.0	15.0	6.0	6.0	3.0							

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] For entire season, planting to harvest. Includes winter abandonment, which is estimated on May 1 of each season.

TABLE 4.—*Wheat, all: Acreage harvested and production, by States, average 1924–1928, annual 1928–1931*

State and division	Acreage harvested					Production				
	Average, 1924–1928	1928	1929	1930	1931[1]	Average, 1924–1928	1928	1929	1930	1931[1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Maine	5	4	2	2	2	114	80	46	44	44
Vermont	1	1	1	1	1	28	16	18	20	21
New York	306	316	242	224	211	5, 599	4, 702	3, 864	4, 086	5, 311
New Jersey	58	60	54	53	49	1, 215	1, 200	1, 107	1, 246	1, 323
Pennsylvania	1, 129	1, 108	987	986	909	20, 450	17, 171	17, 278	21, 682	19, 987
North Atlantic	1, 499	1, 489	1, 286	1, 266	1, 172	27, 406	23, 169	22, 313	27, 078	26, 686
Ohio	1, 551	872	1, 564	1, 612	1, 723	27, 335	9, 475	30, 503	28, 712	50, 744
Indiana	1, 576	910	1, 568	1, 584	1, 678	25, 302	10, 040	25, 909	28, 527	43, 327
Illinois	2, 202	1, 563	2, 093	1, 921	1, 935	34, 737	22, 939	30, 831	35, 086	45, 076
Michigan	893	887	790	705	711	17, 232	14, 202	13, 682	16, 160	18, 446
Wisconsin	121	104	96	99	88	2, 587	2, 141	1, 881	2, 063	1, 544
Minnesota	1, 841	1, 532	1, 421	1, 366	1, 224	27, 366	22, 964	20, 471	22, 626	18, 011
Iowa	422	452	426	432	381	8, 096	8, 723	7, 977	8, 869	7, 594
Missouri	1, 559	1, 511	1, 534	1, 275	1, 497	20, 054	19, 194	15, 400	17, 838	29, 933
North Dakota	9, 763	10, 810	10, 440	9, 896	6, 204	121, 692	155, 358	99, 950	108, 471	32, 717
South Dakota	2, 685	3, 360	3, 583	3, 808	2, 796	31, 783	34, 928	34, 799	45, 279	15, 831
Nebraska	3, 223	3, 672	3, 700	3, 939	3, 465	55, 300	69, 919	55, 403	71, 557	58, 376
Kansas	9, 797	10, 473	12, 081	12, 357	12, 632	135, 319	177, 833	148, 544	166, 702	239, 868
North Central	35, 631	36, 146	39, 296	38, 994	34, 334	506, 804	547, 716	485, 350	551, 890	561, 467
Delaware	101	102	106	105	91	1, 885	1, 836	2, 014	2, 048	2, 138
Maryland	514	530	506	481	404	9, 638	8, 745	9, 108	11, 063	9, 696
Virginia	661	673	657	591	603	9, 373	9, 758	8, 607	9, 160	13, 266
West Virginia	132	122	104	105	113	1, 826	1, 586	1, 362	1, 838	2, 373
North Carolina	439	444	353	265	339	5, 211	5, 150	3, 636	2, 862	4, 407
South Carolina	59	64	52	34	53	723	800	520	340	689
Georgia	100	94	48	26	49	1, 101	1, 034	408	273	637
South Atlantic	2, 006	2, 029	1, 826	1, 607	1, 652	29, 756	28, 909	25, 655	27, 584	33, 206
Kentucky	222	125	204	202	242	2, 773	1, 000	2, 530	2, 828	4, 840
Tennessee	413	422	280	202	252	4, 635	3, 714	2, 492	2, 222	4, 410
Alabama	6	4	2	2	4	70	44	20	20	50
Mississippi	5	3	---	---	---	76	60	---	---	---
Arkansas	29	22	17	18	36	350	253	158	203	475
Oklahoma	3, 867	4, 413	4, 576	3, 935	4, 407	50, 566	59, 576	51, 251	37, 382	74, 919
Texas	1, 570	2, 016	2, 970	3, 029	3, 635	20, 944	22, 176	44, 550	31, 804	57, 433
South Central	6, 112	7, 005	8, 049	7, 388	8, 576	79, 414	86, 823	101, 001	74, 459	142, 127
Montana	3, 622	4, 275	4, 419	4, 217	2, 182	57, 954	77, 998	41, 290	35, 313	14, 684
Idaho	1, 026	1, 160	1, 294	1, 245	1, 059	25, 580	28, 792	28, 835	30, 691	19, 641
Wyoming	193	243	341	343	243	3, 332	3, 897	4, 394	4, 014	2, 146
Colorado	1, 374	1, 339	1, 539	1, 632	1, 394	18, 395	18, 564	17, 934	23, 356	16, 552
New Mexico	157	186	320	211	284	2, 364	2, 054	4, 435	1, 904	5, 112
Arizona	41	47	19	22	24	1, 015	1, 269	475	616	672
Utah	234	257	265	276	257	5, 490	6, 861	5, 304	6, 892	4, 679
Nevada	16	18	14	13	14	424	482	352	328	319
Washington	2, 112	2, 271	2, 295	2, 305	2, 357	42, 922	48, 644	42, 721	38, 278	40, 843
Oregon	994	1, 027	1, 075	1, 027	945	20, 478	23, 318	21, 500	23, 621	17, 662
California	645	780	633	592	456	11, 830	16, 380	11, 014	12, 136	6, 475
Western	10, 415	11, 603	12, 214	11, 883	9, 215	189, 785	228, 259	178, 254	177, 149	128, 785
United States	55, 663	58, 272	62, 671	61, 138	54, 949	833, 165	914, 876	812, 573	858, 160	892, 271

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.

TABLE 5.—*Wheat, winter: Acreage harvested and production, by States, average 1924–1928, annual 1928–1931*

State and division	Acreage harvested					Production				
	Average, 1924–1928	1928	1929	1930	1931 [1]	Average, 1924–1928	1928	1929	1930	1931 [1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
New York	297	306	233	214	201	5, 431	4, 529	3, 728	3, 916	5, 126
New Jersey	58	60	54	53	49	1, 215	1, 200	1, 107	1, 246	1, 323
Pennsylvania	1, 124	1, 101	976	976	898	20, 375	17, 066	17, 080	21, 472	19, 756
North Atlantic	1, 479	1, 467	1, 263	1, 243	1, 148	27, 021	22, 795	21, 915	26, 634	26, 205
Ohio	1, 546	864	1, 554	1, 601	1, 713	27, 219	9, 331	30, 303	28, 498	50, 534
Indiana	1, 569	900	1, 553	1, 569	1, 663	25, 199	9, 900	25, 624	28, 242	43, 072
Illinois	2, 054	1, 261	1, 978	1, 800	1, 836	32, 078	17, 654	28, 681	32, 400	43, 146
Michigan	888	882	780	694	701	17, 138	14, 112	13, 494	15, 962	18, 226
Wisconsin	62	42	30	32	24	1, 357	777	660	656	456
Minnesota	156	165	162	167	152	3, 024	2, 640	3, 402	3, 340	3, 192
Iowa	388	411	379	387	333	7, 552	8, 014	7, 201	8, 127	6, 826
Missouri	1, 548	1, 496	1, 522	1, 263	1, 490	19, 906	18, 999	15, 220	17, 682	29, 800
South Dakota	104	105	75	96	185	1, 361	1, 260	1, 065	1, 632	1, 166
Nebraska	3, 038	3, 492	3, 506	3, 751	3, 339	52, 456	66, 697	52, 590	68, 643	57, 431
Kansas	9, 782	10, 433	12, 034	12, 310	12, 618	135, 180	177, 361	148, 018	166, 185	239, 742
North Central	21, 133	20, 051	23, 573	23, 670	24, 054	322, 471	326, 745	326, 258	371, 367	493, 591
Delaware	101	102	106	105	91	1, 885	1, 836	2, 014	2, 048	2, 138
Maryland	514	530	506	481	404	9, 638	8, 745	9, 108	11, 063	9, 696
Virginia	661	673	657	591	603	9, 373	9, 758	8, 607	9, 160	13, 266
West Virginia	132	122	104	105	113	1, 826	1, 586	1, 362	1, 838	2, 373
North Carolina	439	444	353	265	339	5, 211	5, 150	3, 636	2, 862	4, 407
South Carolina	59	64	52	34	53	723	800	520	340	689
Georgia	100	94	48	26	49	1, 101	1, 034	408	273	637
South Atlantic	2, 006	2, 029	1, 826	1, 607	1, 652	29, 756	28, 909	25, 655	27, 584	33, 206
Kentucky	222	125	204	202	242	2, 773	1, 000	2, 530	2, 828	4, 840
Tennessee	413	422	280	202	252	4, 635	3, 714	2, 492	2, 222	4, 410
Alabama	6	4	2	2	4	70	44	20	20	50
Mississippi	5	3	------	------	------	76	60	------	------	------
Arkansas	29	22	17	18	36	350	253	158	203	475
Oklahoma	3, 867	4, 413	4, 576	3, 935	4, 407	50, 566	59, 576	51, 251	37, 382	74, 919
Texas	1, 570	2, 016	2, 970	3, 029	3, 635	20, 944	22, 176	44, 550	31, 804	57, 433
South Central	6, 112	7, 005	8, 049	7, 388	8, 576	79, 414	86, 823	101, 001	74, 459	142, 127
Montana	563	803	624	686	412	9, 489	12, 045	9, 048	6, 380	4, 120
Idaho	447	456	703	731	673	10, 253	10, 488	14, 060	16, 813	12, 114
Wyoming	48	75	132	161	161	777	1, 125	1, 782	2, 012	1, 449
Colorado	1, 069	923	1, 204	1, 324	1, 218	13, 289	11, 076	13, 244	19, 198	14, 616
New Mexico	123	150	288	181	257	1, 826	1, 500	3, 917	1, 484	4, 626
Arizona	41	47	19	22	24	1, 015	1, 269	475	616	672
Utah	148	162	185	194	194	2, 940	3, 726	2, 960	4, 268	3, 104
Nevada	4	4	4	2	3	100	104	112	42	66
Washington	1, 014	1, 424	1, 151	875	1, 356	24, 306	35, 600	27, 048	19, 688	29, 832
Oregon	751	837	926	833	825	16, 150	20, 088	18, 520	19, 159	15, 262
California	645	780	633	592	456	11, 830	16, 380	11, 014	12, 136	6, 475
Western	4, 854	5, 661	5, 869	5, 601	5, 579	91, 975	113, 401	102, 180	101, 796	92, 336
United States	35, 585	36, 213	40, 580	39, 509	41, 009	550, 636	578, 673	577, 009	601, 840	787, 465

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.

TABLE 6.—*Wheat, spring: Acreage harvested and production, by States, average 1924–1928, annual 1928–1931*

SPRING WHEAT OTHER THAN DURUM

State and division	Acreage harvested					Production				
	Average, 1924–1928	1928	1929	1930	1931 [1]	Average, 1924–1928	1928	1929	1930	1931 [1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Maine	5	4	2	2	2	114	80	46	44	44
Vermont	1	1	1	1	1	28	16	18	20	21
New York	9	10	9	10	10	168	173	136	170	185
Pennsylvania	[2] 7	7	11	10	11	[2] 125	105	198	210	231
North Atlantic	20	22	23	23	24	385	374	398	444	481
Ohio	5	8	10	11	10	116	144	200	214	210
Indiana	6	10	15	15	15	102	140	285	285	255
Illinois	148	302	115	121	99	2,659	5,285	2,150	2,686	1,930
Michigan	5	5	10	11	10	94	90	188	198	220
Wisconsin	59	62	66	67	64	1,230	1,364	1,221	1,407	1,088
Minnesota	1,472	1,032	1,038	996	946	21,042	14,964	13,909	15,936	13,055
Iowa	34	41	47	45	48	544	709	776	742	768
Missouri	10	15	12	12	7	149	195	180	156	133
North Dakota	5,942	5,660	6,590	6,854	4,318	68,948	78,108	62,605	71,967	21,590
South Dakota	1,615	1,933	2,038	2,242	1,774	18,187	19,523	19,769	26,007	9,225
Nebraska	185	180	194	188	126	2,844	3,222	2,813	2,914	945
Kansas	15	40	47	47	14	139	472	526	517	126
North Central	9,498	9,288	10,182	10,609	7,431	116,054	124,216	104,622	123,029	49,545
Montana	3,018	3,443	3,765	3,501	1,750	47,865	65,417	32,002	28,708	10,500
Idaho	578	704	591	514	386	15,327	18,304	14,775	13,878	7,527
Wyoming	145	168	209	182	82	2,555	2,772	2,612	2,002	697
Colorado	305	416	335	308	176	5,106	7,488	4,690	4,158	1,936
New Mexico	34	36	32	30	27	537	554	518	420	486
Utah	86	95	80	82	63	2,550	3,135	2,344	2,624	1,575
Nevada	12	14	10	11	11	325	378	240	286	253
Washington	1,098	847	1,144	1,430	1,001	18,617	13,044	15,673	18,590	11,011
Oregon	243	190	149	194	120	4,328	3,230	2,980	4,462	2,400
Western	5,520	5,913	6,315	6,252	3,616	97,210	114,322	75,834	75,128	36,385
United States	15,038	15,223	16,520	16,884	11,071	213,649	238,912	180,854	198,601	86,411

DURUM WHEAT

State and division	Average, 1924–1928	1928	1929	1930	1931 [1]	Average, 1924–1928	1928	1929	1930	1931 [1]
Minnesota	213	335	221	203	126	3,300	5,360	3,160	3,350	1,764
North Dakota	3,821	5,150	3,850	3,042	1,886	52,743	77,250	37,345	36,504	11,127
South Dakota	966	1,322	1,470	1,470	837	12,236	14,145	13,965	17,640	5,440
Montana	40	29	30	30	20	600	536	240	225	64
4 States	5,040	6,836	5,571	4,745	2,869	68,879	97,291	54,710	57,719	18,395

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.
[2] 3-year average.

TABLE 7.—*Wheat: Yield per acre and estimated price per bushel December 1, by States, averages, and annual 1926–1931*

ALL WHEAT, INCLUDING DURUM

State and division	Yield per acre: Average, 1919–1928	1926	1927	1928	1929	1930	1931	Estimated price per bushel, Dec. 1: Average, 1925–1929	1926	1927	1928	1929	1930	1931
	Bus.	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Maine	22.1	20.0	18.0	20.0	23.2	22.0	22.0	167	175	175	165	150	105	70
Vermont	18.9	20.0	20.0	16.0	18.0	20.0	21.0	136	132	140	131	125	100	80
New York	19.3	17.5	20.9	14.9	16.0	18.2	25.2	134	132	125	137	124	79	57
New Jersey	19.8	22.0	23.0	20.0	20.5	23.5	27.0	129	132	125	124	123	87	57
Pennsylvania	18.0	20.0	18.5	15.5	17.5	22.0	22.0	131	129	127	129	121	80	56
North Atlantic	18.4	19.6	19.2	15.6	17.4	21.4	22.8	131.3	129.8	126.6	130.4	121.7	80.4	56.4
Ohio	16.2	22.5	18.0	10.9	19.5	17.8	29.5	131	127	125	131	116	76	50
Indiana	14.8	20.0	15.5	11.0	16.5	18.0	25.8	128	124	124	124	112	71	45
Illinois	16.2	18.0	13.9	14.7	14.7	18.3	23.3	123	122	120	112	111	69	45
Michigan	17.8	18.3	21.5	16.0	17.3	22.9	25.9	128	122	120	128	113	73	50
Wisconsin	18.2	20.3	21.7	20.6	19.6	20.8	17.5	119	126	117	106	110	73	58
Minnesota	13.1	12.9	11.9	15.0	14.4	16.6	14.7	114	123	110	96	106	58	55
Iowa	18.7	21.4	18.7	19.3	18.7	20.5	19.9	116	120	117	100	106	65	45
Missouri	12.7	15.3	10.0	12.7	10.0	14.0	20.0	126	124	122	121	113	74	45
North Dakota	10.8	8.0	12.7	14.4	9.6	11.0	5.3	106	117	103	81	98	51	50
South Dakota	10.7	6.1	14.9	10.4	9.7	11.9	5.7	106	118	106	85	93	46	48
Nebraska	15.4	13.0	20.3	19.0	15.0	18.2	16.8	112	117	109	94	99	53	40
Kansas	13.2	14.8	11.2	17.0	12.3	13.5	19.0	116	119	117	94	100	56	37
North Central	13.1	13.3	13.8	15.2	12.4	14.2	16.4	114.2	120.3	112.2	93.7	102.4	57.8	42.4
Delaware	16.8	20.0	19.0	18.0	19.0	19.5	23.5	128	130	125	125	116	78	53
Maryland	17.4	23.0	17.5	16.5	18.0	23.0	24.0	131	130	127	127	118	77	52
Virginia	13.1	16.5	12.2	14.5	13.1	15.5	22.0	137	131	132	135	125	97	58
West Virginia	13.2	16.0	13.3	13.0	13.1	17.5	21.0	140	135	137	137	133	102	61
North Carolina	10.7	14.1	10.7	11.6	10.3	10.8	13.0	150	143	145	152	141	109	72
South Carolina	11.2	16.0	11.0	12.5	10.0	10.0	13.0	161	155	152	161	150	131	83
Georgia	10.3	15.0	9.2	11.0	8.5	10.5	13.0	162	150	155	167	155	135	90
South Atlantic	13.5	17.7	13.3	14.2	14.0	17.2	20.1	138.3	134.3	134.2	136.9	125.5	89.9	59.1
Kentucky	11.6	18.5	9.5	8.0	12.4	14.0	20.0	138	133	135	138	126	91	54
Tennessee	10.5	18.0	7.0	8.8	8.9	11.0	17.5	143	136	139	143	132	100	65
Alabama	10.6	13.4	10.6	11.0	10.0	10.0	12.5	160	160	155	157	152	135	80
Mississippi	14.9	17.0	17.0	20.0	----	----	----	139	129	135	137	----	----	----
Arkansas	11.3	13.5	11.5	11.5	9.3	11.3	13.2	131	128	125	122	129	98	52
Oklahoma	12.7	17.5	9.0	13.5	11.2	9.5	17.0	117	118	120	100	99	59	38
Texas	12.3	18.2	9.7	11.0	15.0	10.5	15.8	122	120	121	110	105	70	41
South Central	12.4	17.7	9.1	12.4	12.5	10.1	16.6	120.6	120.4	122.3	105.0	103.2	66.3	40.7
Montana	13.3	12.5	20.8	18.2	9.3	8.4	6.7	105	112	96	83	95	48	55
Idaho	23.8	23.6	27.6	24.8	22.3	24.7	18.5	103	106	98	90	95	52	46
Wyoming	16.8	18.8	18.5	16.0	12.9	11.7	8.8	99	107	94	83	89	50	46
Colorado	13.9	12.7	14.2	13.9	11.7	14.3	11.9	105	107	104	85	93	53	43
New Mexico	13.6	22.7	10.4	11.0	13.9	9.0	18.0	116	110	119	107	95	61	45
Arizona	24.3	25.0	25.0	27.0	25.0	28.0	28.0	141	130	135	130	135	105	66
Utah	21.7	23.2	23.5	26.7	20.0	25.0	18.2	107	105	102	98	102	66	54
Nevada	24.8	24.0	25.6	26.8	25.1	25.2	22.8	128	116	125	122	128	104	79
Washington	19.5	19.4	25.8	21.4	18.6	16.6	17.3	112	116	108	100	107	56	51
Oregon	20.7	18.2	25.1	22.7	20.0	23.0	18.7	116	120	112	103	111	58	51
California	17.8	18.4	16.8	21.0	17.4	20.5	14.2	127	130	118	118	120	85	65
Western	17.2	16.6	21.8	19.7	14.6	14.9	14.0	109.2	113.4	103.1	93.4	101.3	56.3	50.4
United States	14.1	14.8	14.9	15.7	13.0	14.0	16.2	114.7	119.8	111.5	97.0	103.5	60.0	44.3
DURUM														
Minnesota	14.4	14.0	13.2	16.0	14.3	16.5	14.0	----	----	105	81	97	51	50
North Dakota	12.2	9.5	14.0	15.0	9.7	12.0	5.9	----	----	100	71	89	46	46
South Dakota	12.4	6.6	16.5	10.7	9.5	12.0	6.5	----	----	102	73	85	42	43
Montana	12.7	8.6	20.0	18.5	8.0	7.5	3.2	----	----	97	84	88	42	48
Average	12.3	9.2	14.4	14.2	9.8	12.2	6.4	----	----	100.6	71.9	88.4	45.1	45.5

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

TABLE 8.—*Wheat: Acreage, yield per acre, and production in specified countries, average 1921–22 to 1925–26, annual 1928–29 to 1931–32*

Country	Acreage					Yield per acre					Production				
	Average 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32[1]	Average 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32[1]	Average 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32[1]
NORTHERN HEMISPHERE	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
North America:															
Canada	22,083	24,119	25,255	24,898	26,115	16.6	23.5	12.1	16.9	11.6	366,483	566,726	304,520	420,672	304,144
United States	58,115	58,272	62,671	61,138	54,949	13.8	15.7	13.0	14.0	16.2	804,218	914,876	812,573	858,160	892,271
Mexico	2,098	1,283	1,293	1,216	1,424	5.0	8.6	8.8	9.4	11.1	10,388	11,031	11,333	11,446	15,778
Guatemala	24	20	18	23	------	9.2	8.4	10.4	8.1	------	222	167	187	186	------
Europe:															
United Kingdom—															
England and Wales	1,746	1,396	1,330	1,346	1,197	33.7	33.9	35.7	29.7	30.0	58,800	47,264	47,451	39,960	35,887
Scotland	57	58	51	54	50	39.5	39.9	42.5	39.4	35.8	2,251	2,315	2,165	2,128	1,792
Northern Ireland	6	5	4	5	3	31.0	36.6	35.5	34.2	------	186	183	142	171	------
Irish Free State	34	31	29	27	21	33.3	38.3	40.8	40.4	------	1,131	1,186	1,184	1,092	------
Norway	27	28	30	30	29	23.6	28.5	25.0	24.0	25.9	637	798	750	720	752
Sweden	352	561	574	647	684	30.1	32.7	33.1	33.2	28.7	10,602	18,331	19,011	21,469	19,621
Denmark	202	252	260	249	259	44.4	48.5	45.3	41.0	38.3	8,973	12,214	11,772	10,216	9,921
Netherlands	147	148	112	142	191	42.6	49.6	48.8	42.6	32.8	6,262	7,336	5,467	6,055	6,268
Belgium	339	408	356	411	396	38.9	42.2	37.1	32.2	38.5	13,194	17,215	13,225	13,236	15,255
Luxemburg	23	37	21	25	23	17.0	19.3	13.1	17.7	17.7	392	713	275	442	406
France	13,507	12,956	13,336	13,202	12,496	21.5	21.7	25.3	17.5	21.6	290,774	281,285	337,252	231,119	269,632
Spain	10,457	10,571	10,622	11,133	11,245	13.6	11.6	14.5	13.2	12.0	142,420	122,640	154,245	146,700	134,427
Portugal	1,078	1,102	1,075	1,120	1,161	10.3	6.8	10.1	12.3	10.4	11,103	7,546	10,814	13,817	12,042
Italy	11,537	12,263	11,794	11,917	12,075	17.2	18.6	22.1	17.6	20.5	198,307	228,598	260,125	210,071	247,935
Switzerland	112	134	134	134	134	30.9	33.4	32.6	26.9	32.5	3,457	4,474	4,372	3,601	4,361
Germany	3,613	4,269	3,955	4,401	5,355	27.3	33.2	31.1	31.6	29.0	98,714	141,593	123,062	139,217	155,546
Austria	456	514	515	508	507	18.4	25.1	22.4	23.6	18.5	8,400	12,917	11,559	12,008	9,384
Czechoslovakia	1,526	1,918	2,017	1,965	1,976	23.6	27.6	26.2	25.8	19.4	36,015	52,861	52,902	50,606	38,317
Hungary	3,345	4,144	3,708	4,187	4,004	17.8	23.9	20.2	20.1	17.3	59,678	99,211	74,985	84,339	69,186
Yugoslavia	3,953	4,683	5,213	5,246	5,390	14.9	22.1	18.2	15.3	18.3	58,753	103,294	94,999	80,326	98,789
Greece	1,075	1,329	1,237	1,312	------	8.8	9.8	9.2	9.2	------	9,417	13,085	11,434	12,048	12,228
Bulgaria	2,390	2,813	2,662	3,006	2,964	13.1	17.5	12.5	19.1	20.6	31,399	49,153	33,195	57,317	61,195
Rumania	7,068	7,923	6,764	7,551	8,566	12.7	14.6	14.7	17.3	15.8	89,570	115,544	99,753	130,771	135,289
Poland	2,957	3,187	3,526	4,066	4,496	16.5	18.6	18.7	20.2	18.0	48,708	59,219	65.862	82,321	80,835
Lithuania	214	393	488	526	470	16.6	16.1	19.1	21.5	17.4	3,563	6,327	9,329	11,327	8,156
Latvia	89	164	145	179	215	16.0	15.2	16.1	22.7	16.3	1,426	2,499	2,336	4,062	3,502
Estonia	47	70	82	90	99	14.2	14.8	15.4	18.2	16.5	667	1,037	1,260	1,635	1,633

Finland	36	46	34	51	47	20.5	21.7	22.5	23.7	24.7	739	998	765	1,210	1,161
Russia	43,128	71,956	81,000	83,792	92,854	9.8	11.1	8.7	12.9	---	424,233	795,235	702,851	1,084,000	---
Estimated European total, excluding Russia	66,400	71,400	70,100	73,500	75,300	---	---	---	---	---	1,196,000	1,410,000	1,450,000	1,368,000	1,435,000
Africa:															
Morocco	2,272	2,665	3,011	2,957	2,732	9.6	9.3	10.5	7.2	12.7	21,758	24,749	31,764	21,302	34,708
Algeria	3,406	3,656	3,795	4,027	3,535	7.8	8.3	8.8	8.1	8.4	26,716	30,339	33,307	32,439	29,578
Tunis	1,425	2,020	1,732	1,922	1,927	5.5	6.7	7.1	5.4	7.2	7,892	13,595	12,309	10,398	13,962
Egypt	1,462	1,590	1,614	1,522	1,649	25.2	23.5	28.0	26.1	27.9	36,806	37,296	45,228	39,753	46,071
Asia:															
Turkey	[2] 7,058	7,112	5,947	6,393	---	[2] 5.6	8.3	16.8	13.9	---	[2] 39,510	59,196	99,900	89,033	---
India	29,560	32,193	31,973	31,654	32,181	11.4	9.0	10.0	12.3	10.8	336,269	290,864	320,731	390,843	347,275
Japanese Empire—															
Japan	1,197	1,201	1,213	1,204	1,231	22.5	25.7	25.1	24.5	25.1	26,899	30,812	30,496	29,538	30,892
Chosen	882	896	874	848	817	11.6	9.6	9.5	10.6	10.2	10,208	8,595	8,320	8,985	8,341
Taiwan	7	1	1	1	---	9.1	15.0	13.0	13.0	---	64	15	13	13	---
Kwantung	4	4	3	3	---	11.8	8.0	11.7	15.3	---	47	32	35	46	---
Estimated Asiatic total, excluding Russia and China	38,600	43,500	42,000	42,300	42,400	---	---	---	---	---	437,000	409,000	491,000	553,000	525,000
Estimated Northern Hemisphere total, excluding Russia and China	195,900	208,700	211,600	213,800	210,200	---	---	---	---	---	2,908,000	3,419,000	3,194,000	3,317,000	3,297,000
SOUTHERN HEMISPHERE															
Chile	1,446	1,715	1,724	1,609	1,517	17.8	17.3	19.4	13.2	---	25,761	29,679	33,529	21,190	---
Uruguay	867	1,085	1,097	864	1,154	11.2	11.3	12.0	8.4	10.2	9,680	12,304	13,157	7,218	11,759
Argentina	16,932	22,426	15,903	19,675	[3] 17,295	12.0	15.6	10.2	12.0	12.6	203,388	349,051	162,576	235,960	218,623
Union of South Africa	868	825	942	1,137	---	8.6	8.8	11.8	9.0	---	7,451	7,238	11,140	10,180	12,188
Southern Rhodesia	[4] 4	3	5	6	---	[4] 7.8	7.7	8.6	6.7	---	[4] 31	23	43	40	---
Australia	10,010	14,840	14,977	18,213	13,990	12.8	10.8	8.5	11.7	12.2	128,520	159,679	126,885	212,629	170,966
New Zealand	224	255	236	221	276	29.6	34.6	30.7	32.0	---	6,640	8,833	7,240	7,075	---
Estimated Southern Hemisphere total	31,000	42,600	40,500	44,200	36,200	---	---	---	---	---	390,000	580,000	368,000	504,000	452,000
Estimated world total, excluding Russia and China	226,900	251,300	252,100	258,000	246,400	---	---	---	---	---	3,298,000	3,999,000	3,562,000	3,821,000	3,749,000

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930–31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

[1] Preliminary. [2] Year 1925. [3] Area sown. [4] 3-year average.

TABLE 9.—*Wheat: World production, 1890–91 to 1931–32*

Crop year	World production excluding Russia and China	Northern Hemisphere production excluding Russia and China	European production excluding Russia	Selected countries						
				Russia [1]	United States	Canada	India	Argentina	Australia	France
	Million bushels	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*
1890–91	1,878	1,802	1,056	212	378	42	229	31	27	330
1891–92	1,989	1,904	900	173	585	42	257	36	26	215
1892–93	2,053	1,938	1,045	255	528	48	227	59	33	311
1893–94	2,076	1,936	1,097	375	428	41	286	82	37	278
1894–95	2,128	2,018	1,080	355	516	43	271	61	28	344
1895–96	2,126	2,039	1,057	310	569	41	261	46	18	340
1896–97	2,057	1,986	1,103	412	544	33	201	32	21	340
1897–98	1,893	1,790	842	340	610	47	200	53	28	242
1898–99	2,552	2,374	1,168	459	772	63	269	105	41	365
1899–1900	2,319	2,150	1,113	454	636	57	255	102	40	365
1900–01	2,210	2,064	1,096	423	603	56	200	75	48	326
1901–02	2,472	2,357	1,103	428	789	85	265	56	39	311
1902–03	2,510	2,368	1,207	607	725	94	227	104	12	328
1903–04	2,651	2,412	1,266	621	664	78	298	130	74	363
1904–05	2,478	2,238	1,116	667	597	69	360	151	55	300
1905–06	2,673	2,441	1,223	636	727	106	283	135	69	335
1906–07	2,950	2,694	1,356	543	757	126	320	156	66	329
1907–08	2,619	2,344	1,176	571	638	93	317	192	45	381
1908–09	2,544	2,283	1,181	628	645	112	229	156	63	317
1909–10	2,819	2,554	1,240	846	700	167	285	131	90	359
1910–11	2,777	2,495	1,201	836	635	132	360	146	95	253
1911–12	3,043	2,758	1,347	563	621	231	376	166	72	322
1912–13	3,093	2,770	1,284	801	730	224	371	187	92	334
1913–14	3,098	2,853	1,301	1,028	763	232	368	105	103	319
1914–15	2,834	2,601	1,072	[2] 834	891	161	312	169	25	283
1915–16	3,497	3,102	1,125	[3] 827	1,026	394	377	169	179	223
1916–17	2,734	2,457	1,049	[4] 531	636	263	323	84	152	205
1917–18	2,574	2,178	740	622	637	234	382	235	115	[5] 135
1918–19	2,911	2,608	909	-------	921	189	370	180	76	229
1919–20	2,821	2,517	899	-------	968	193	280	217	46	187
1920–21	2,948	2,595	949	320	833	263	378	156	146	237
1921–22	3,173	2,791	1,222	205	815	301	250	191	129	323
1922–23	3,223	2,865	1,044	243	868	400	367	196	109	243
1923–24	3,557	3,124	1,257	419	797	474	372	248	125	276
1924–25	3,150	2,739	1,058	472	864	262	361	191	165	281
1925–26	3,388	3,020	1,397	782	677	395	331	191	115	330
1926–27	3,493	3,043	1,216	914	831	407	325	230	161	232
1927–28	3,675	3,202	1,275	785	878	480	335	282	118	276
1928–29	3,999	3,419	1,410	795	915	567	291	349	160	281
1929–30 [6]	3,562	3,194	1,450	703	813	305	321	163	127	337
1930–31 [6]	3,821	3,317	1,368	1,084	858	421	391	236	213	231
1931–32 [6]	3,749	3,297	1,435	-------	892	304	347	219	171	270

Bureau of Agricultural Economics. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

[1] Includes all Russian territory reporting for years named.

[2] Total Russian Empire exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.

[3] Exclusive of Russian Poland, Lithuania, parts of present Latvia and Ukraine, and 2 Provinces of Transcaucasia.

[4] Beginning with this date estimated production is within present boundaries of the Union of Socialist Soviet Republics, excluding Turkestan, Transcaucasia, and the Far East, which regions in 1924 produced 51,706,000 bushels, and in 1925, 58,000,000 bushels.

[5] Beginning with this date production is within postwar boundaries and therefore not comparable with earlier years.

[6] Preliminary.

TABLE 10.—*Wheat, all: Monthly marketings by farmers, as reported by about 3,500 mills and elevators, United States, 1921–22 to 1930–31*

Crop year	Percentage of year's receipts												
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Season
1921–22	19.1	18.2	16.4	10.6	6.8	5.4	4.4	4.9	3.9	3.2	3.5	3.6	100.0
1922–23	14.8	17.3	14.2	12.0	8.6	7.4	5.5	5.1	4.3	3.7	3.4	3.7	100.0
1923–24	13.4	17.6	16.7	13.7	9.5	6.2	4.6	4.8	3.3	2.9	3.7	3.6	100.0
1924–25	13.6	19.8	17.5	14.5	8.6	5.6	5.3	4.2	2.5	1.6	3.1	3.7	100.0
1925–26	14.6	18.6	18.7	10.9	8.6	7.0	4.7	4.0	3.0	3.0	2.9	4.0	100.0
1926–27	21.8	20.3	13.2	10.0	5.8	5.0	4.6	4.6	3.6	2.4	3.2	5.5	100.0
1927–28	15.4	18.6	19.6	12.6	7.7	5.6	4.5	4.1	3.8	2.5	2.5	3.1	100.0
1928–29	17.9	18.6	17.0	11.6	7.0	5.4	3.8	4.3	3.4	2.5	2.6	5.9	100.0
1929–30	26.7	23.4	13.5	8.1	4.5	4.5	3.0	2.8	2.3	2.4	2.6	6.2	100.0
1930–31	24.2	20.7	12.1	6.9	4.0	4.8	4.6	4.8	3.6	3.3	4.0	7.0	100.0

Bureau of Agricultural Economics.

TABLE 11.—*Wheat, all: Receipts inspected, by markets, 1922–23 to 1930–31*

Market	Year beginning July								
	1922–23	1923–24	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Minneapolis	126,508	99,366	76,960	118,730	85,466	129,966	119,605	83,291	97,673
Duluth	71,154	38,460	102,654	67,447	49,985	98,032	89,357	41,822	47,011
Kansas City	77,302	59,948	86,713	51,571	90,535	74,595	101,190	83,123	90,607
Chicago	39,207	43,017	59,831	19,058	30,811	34,592	25,827	28,492	41,821
St. Louis	27,254	26,859	26,909	25,148	26,247	24,423	34,714	27,769	31,348
Omaha	28,760	19,763	31,660	16,903	21,642	30,008	34,689	31,673	46,907
Wichita	21,185	22,151	29,559	18,972	28,166	21,191	30,584	28,985	26,077
Portland, Oreg	22,395	36,732	21,559	27,892	35,299	42,931	27,612	26,332	28,436
New York	27,368	9,186	21,978	6,334	33,855	45,096	41,102	11,939	6,707
Philadelphia	36,893	6,252	18,236	5,767	6,933	4,026	1,378	1,525	2,081
Baltimore	13,434	16,480	14,286	13,862	21,204	13,904	17,854	8,862	12,182
New Orleans	24,628	6,261	32,630	2,235	8,908	7,622	5,810	10,035	8,260
Galveston	17,400	7,055	33,953	2,769	44,781	11,332	16,572	22,991	20,222
All other inspection points	224,418	213,715	256,192	201,036	308,383	260,728	346,593	368,688	345,972
Total	757,906	605,245	813,120	577,724	792,215	798,466	892,887	775,527	805,304

Bureau of Agricultural Economics. Compiled from reports of licensed inspectors through district offices of Federal grain inspection. The quantity loaded per car varies, but car-lot receipts have been converted to bushels by using a factor of 1,300 bushels to a car.

TABLE 12.—*Wheat: Receipts inspected, all inspection points, United States, by months, 1917–18 to 1930–31*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1917–18	13,347	40,988	46,192	61,233	58,479	33,858	21,947	15,012	14,984	13,878	13,494	12,408	345,820
1918–19	66,639	154,683	140,008	107,875	69,210	95,515	45,861	25,528	32,984	23,826	28,809	18,936	809,874
1919–20	90,870	151,674	124,209	89,025	60,875	48,721	42,514	32,131	33,190	29,611	39,638	43,375	785,833
1920–21	65,634	95,897	102,430	96,562	75,903	67,392	64,323	50,272	46,485	59,762	60,271	68,307	853,238
1921–22	137,839	147,696	122,571	87,586	48,424	53,422	44,283	46,346	40,635	28,398	44,347	40,039	841,586
1922–23	87,314	116,431	91,078	77,083	76,625	76,764	62,920	35,863	38,611	34,857	30,698	29,662	757,906
1923–24	80,391	104,682	72,726	65,907	58,718	45,287	30,216	37,436	28,772	21,012	31,078	29,020	605,245
1924–25	91,850	148,100	125,347	129,769	84,376	49,217	37,809	35,642	31,922	18,568	28,179	32,341	813,120
1925–26	70,715	75,495	84,804	49,370	57,292	53,128	32,040	30,202	26,305	25,310	29,206	43,857	577,724
1926–27	158,298	134,553	90,938	67,998	51,875	42,163	42,536	44,334	40,291	35,014	40,579	43,636	792,215
1927–28	103,236	118,828	127,067	104,410	73,841	49,513	43,417	40,325	43,928	31,061	38,214	24,606	798,446
1928–29	145,487	126,043	114,787	117,295	73,392	61,513	41,603	48,536	45,028	31,494	36,536	51,173	892,887
1929–30	209,371	152,871	82,242	57,525	32,495	40,912	29,461	35,931	25,663	22,629	30,615	55,812	775,527
1930–31	194,589	135,477	84,161	48,238	33,914	38,770	47,376	46,201	42,311	32,583	46,533	55,151	805,304

Bureau of Agricultural Economics. Compiled from reports of licensed inspectors through district offices of Federal grain inspection. The quantity loaded per car varies, but car-lot receipts have been converted to bushels by using a factor of 1,300 bushels to a car.

TABLE 13.—*Wheat: Receipts inspected, all inspection points, by classes, and grades, 1926–27 to 1930–31*

Class, and year beginning July	Grade						Total
	No. 1	No. 2	No. 3	No. 4	No. 5	Sample	
Hard red spring:	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*
1926–27	51, 160	29, 373	23, 823	17, 677	4, 114	10, 706	136, 853
1927–28	106, 285	56, 839	41, 268	18, 763	6, 200	11, 939	241, 294
1928–29	110, 602	36, 986	22, 562	8, 462	4, 625	40, 812	224, 049
1929–30	76, 072	24, 489	13, 376	2, 759	980	5, 602	123, 278
1930–31	76, 942	25, 971	27, 161	9, 455	2, 547	932	143, 008
Durum:							
1926–27	2, 405	10, 548	6, 548	7, 764	1, 395	4, 403	33, 063
1927–28	11, 331	31, 170	9, 692	5, 567	2, 147	2, 414	62, 321
1928–29	5, 248	33, 789	14, 652	9, 169	5, 478	5, 508	73, 844
1929–30	4, 340	20, 261	4, 206	1, 894	1, 258	880	32, 839
1930–31	7, 496	28, 660	4, 062	1, 464	509	307	42, 498
Hard red winter:							
1926–27	201, 893	145, 602	31, 067	10, 084	7, 821	10, 978	407, 445
1927–28	100, 264	123, 475	41, 434	19, 331	11, 127	14, 664	310, 295
1928–29	141, 045	168, 205	69, 541	28, 330	18, 914	16, 836	442, 871
1929–30	99, 115	202, 095	110, 726	34, 014	11, 495	13, 022	470, 467
1930–31	209, 130	170, 336	45, 361	19, 505	10, 586	7, 003	461, 921
Soft red winter:							
1926–27	35, 810	40, 147	11, 656	7, 903	2, 881	6, 011	104, 408
1927–28	10, 563	25, 795	13, 659	7, 942	2, 305	3, 371	63, 635
1928–29	8, 317	15, 856	7, 416	4, 924	1, 654	3, 967	42, 134
1929–30	4, 933	25, 803	19, 668	4, 107	970	1, 709	57, 190
1930–31	35, 847	12, 637	2, 427	610	392	395	52, 308
White:							
1926–27	10, 981	25, 696	8, 215	1, 999	423	659	47, 973
1927–28	17, 822	25, 819	8, 733	3, 072	1, 370	3, 492	60, 308
1928–29	17, 412	19, 438	2, 791	650	228	322	40, 841
1929–30	13, 098	22, 785	3, 667	481	131	346	40, 508
1930–31	11, 786	26, 113	5, 122	568	130	207	43, 926
Mixed:							
1926–27	15, 877	20, 626	10, 011	7, 340	2, 597	6, 022	62, 473
1927–28	14, 807	22, 624	12, 042	5, 570	2, 453	3, 097	60, 593
1928–29	14, 150	23, 338	13, 111	8, 395	5, 621	4, 533	69, 148
1929–30	11, 187	20, 687	11, 454	3, 914	2, 076	1, 927	51, 245
1930–31	22, 092	23, 589	8, 540	4, 582	1, 790	1, 050	61, 643
Total:							
1926–27	318, 126	271, 992	91, 320	52, 767	19, 231	38, 779	792, 215
1927–28	261, 072	285, 722	126, 828	60, 245	25, 602	38, 977	798, 446
1928–29	296, 774	297, 612	130, 073	59, 930	36, 520	71, 978	892, 887
1929–30	208, 745	316, 120	163, 097	47, 169	16, 910	23, 486	775, 527
1930–31	363, 293	287, 306	92, 673	36, 184	15, 954	9, 894	805, 304

Bureau of Agricultural Economics. Compiled from reports of licensed inspectors through district offices of Federal grain inspection. See 1927 Yearbook, p. 752, for data for earlier years. The quantity loaded per car varies, but car-lot receipts have been converted to bushels by using a factor of 1,300 bushels to a car.

TABLE 14.—*Wheat: Visible supply in the United States,*[1] *1922–23 to 1931–32*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1922–23	20, 342	23, 077	32, 479	38, 025	39, 023	39, 764	43, 856	53, 823	54, 562	51, 862	49, 521	37, 203
1923–24	29, 403	40, 526	63, 922	72, 930	79, 034	82, 269	84, 030	75, 111	72, 914	66, 739	50, 383	48, 686
1924–25	38, 597	46, 193	79, 700	92, 353	100, 712	108, 997	99, 121	84, 476	76, 437	62, 766	49, 529	38, 328
1925–26	29, 285	34, 041	39, 800	56, 639	52, 394	52, 686	59, 244	52, 730	48, 105	38, 173	33, 798	23, 170
1926–27	16, 486	34, 575	72, 884	84, 724	81, 175	78, 910	70, 811	62, 317	61, 271	53, 827	42, 402	31, 115
1927–28	25, 516	37, 533	71, 908	88, 755	98, 675	100, 013	94, 336	83, 720	77, 949	73, 220	66, 184	52, 460
1928–29	42, 208	66, 762	96, 798	118, 327	143, 003	145, 234	146, 813	133, 759	130, 034	128, 339	116, 559	99, 966
1929–30	95, 684	145, 504	196, 886	205, 778	209, 426	198, 557	188, 171	173, 483	165, 174	158, 176	140, 315	123, 035
1930–31	112, 755	165, 616	201, 541	219, 108	211, 600	207, 479	200, 007	202, 537	208, 102	213, 052	206, 463	206, 196
1931–32	202, 035	226, 544	251, 430	248, 303	238, 294	235, 955	-------	-------	-------	-------	-------	-------

Bureau of Agricultural Economics. Compiled from Bradstreet's. Includes grain stored at approximately 50 interior and seaboard points of accumulation and grain in transit by canals and lakes; also Pacific coast stocks at Portland, Tacoma, and Seattle.

[1] Saturday nearest the 1st of each month.

TABLE 15.—*Wheat: Commercial stocks in store, 1926–27 to 1931–32*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
DOMESTIC WHEAT IN UNITED STATES [1]												
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1926–27	-------	-------	-------	-------	-------	-------	66,340	56,303	56,262	49,910	37,667	27,833
1927–28	21,052	33,677	62,042	78,811	89,684	91,589	88,581	79,152	72,858	68,791	61,957	48,286
1928–29	38,587	52,421	93,870	115,469	139,493	140,172	144,351	129,646	126,377	124,756	113,392	96,059
1929–30	90,442	136,423	186,847	198,211	202,461	189,926	185,151	168,346	160,674	153,122	135,470	120,303
1930–31	109,327	161,897	201,319	223,826	211,381	206,618	199,649	202,694	208,651	214,242	206,490	209,110
1931–32	203,491	235,727	261,742	256,327	244,043	236,616	-------	-------	-------	-------	-------	-------
UNITED STATES WHEAT IN CANADA												
1926–27	-------	-------	-------	-------	-------	-------	1,067	549	437	378	746	1,344
1927–28	1,362	1,280	4,249	4,560	7,258	5,156	3,933	2,285	1,680	977	863	2,314
1928–29	2,506	2,258	2,546	3,295	8,602	8,280	7,328	3,930	2,139	1,586	1,738	4,865
1929–30	3,332	2,288	4,450	8,770	9,065	9,101	8,546	7,517	6,613	5,860	5,431	4,359
1930–31	4,729	3,961	3,812	4,699	4,756	4,790	4,819	4,802	4,951	4,891	5,897	7,851
1931–32	14,657	22,934	32,236	32,511	31,627	29,414	-------	-------	-------	-------	-------	-------
CANADIAN WHEAT IN UNITED STATES [2]												
1926–27	-------	-------	-------	-------	-------	-------	23,394	14,500	9,532	6,650	10,724	16,749
1927–28	7,472	4,835	3,410	3,784	8,617	31,375	35,764	28,703	19,260	11,848	6,597	11,549
1928–29	11,132	13,605	3,789	7,548	18,291	33,902	46,717	38,327	32,851	23,854	28,772	25,538
1929–30	23,196	23,550	22,025	21,753	28,316	34,527	38,837	35,517	31,516	25,285	17,587	14,372
1930–31	16,435	16,468	12,603	17,304	22,112	30,297	32,266	26,954	18,085	13,990	2,766	5,926
1931–32	5,409	6,244	6,227	9,116	12,596	23,480	-------	-------	-------	-------	-------	-------

Bureau of Agricultural Economics. Compiled from weekly reports to the grain, hay, and feed market news service. Data are for stocks on the Saturday nearest the 1st day of the month.

[1] Includes wheat in store in public and private elevators in 42 important markets and also the wheat afloat in vessels or barges in the harbors of lake and seaboard ports. Wheat in transit either by rail or water, mill stocks, or small private stocks of wheat intended only for local purposes, not included.
[2] Includes wheat stored at lake and seaboard ports, exclusive of wheat in transit on lakes and canals.

TABLE 16.—*Wheat: Production and farm disposition, price per bushel, farm value, gross income, and cash income, United States, 1924–1930*

Year	Production	Used for seed	Fed to livestock	Loss, waste, and shrinkage	Ground at mills for home use or exchanged for flour	Sold or for sale	Farm price,[1] per bushel	Farm value	Gross income	Cash income
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*Dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
1924	864,428	80,635	49,649	7,103	9,965	717,076	1.25	1,083,009	907,460	893,403
1925	676,765	78,895	28,919	5,729	9,935	553,287	1.43	972,141	807,709	792,141
1926	831,381	84,062	36,017	6,667	10,185	694,450	1.22	1,014,420	858,977	845,687
1927	878,374	90,383	42,126	6,667	10,030	729,168	1.18	1,045,858	876,891	863,597
1928	914,876	83,582	53,323	6,566	8,425	762,980	.99	914,906	764,890	754,121
1929	809,176	82,384	55,429	6,524	9,215	655,624	1.05	849,541	696,207	685,328
1930 [2]	850,965	77,198	156,972	7,252	9,860	599,683	.66	566,231	401,441	393,224

Bureau of Agricultural Economics. Estimate prepared April, 1931; not revised to December, 1931, revised estimates of production.

[1] Based on monthly prices weighted by estimated monthly marketing by States which differ from weighted prices in Table 21, in which production weights are used.
[2] Preliminary.

TABLE 17.—*Wheat, including flour: Supply, distribution, and disappearance in continental United States, averages 1899–1900 to 1925–26, annual 1927–28 to 1931–32*

Item	Year beginning July								
	Average 1899–1900 to 1908–09	Average 1909–10 to 1913–14	Average 1914–15 to 1920–21	Average 1921–22 to 1925–26	1927–28	1928–29	1929–30	1930–31	1931–32
SUPPLY									
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Stocks, July 1:									
On farms [1]	46,423	28,872	32,631	37,059	27,222	23,729	45,483	47,417	31,865
In country elevators and mills [1]	27,000	29,000	26,997	30,991	21,776	19,277	41,546	60,166	30,552
Commercial stocks [2]	31,817	24,168	19,290	25,519	21,052	38,587	90,442	109,327	203,967
In merchant mills and elevators [3]	------	------	------	------	37,038	31,920	48,279	46,670	21,808
In transit to merchant mills [3]	------	------	------	------	11,274	10,893	16,237	14,706	12,198
Stored for others by merchant mills [3]	------	------	------	------	------	------	------	12,500	18,413
Total wheat as grain	105,240	82,040	78,918	93,569	118,362	124,406	241,987	290,786	318,803
Flour (in terms of wheat) [4]	7,709	8,305	8,606	8,676	9,076	9,019	13,541	20,497	6,886
Total wheat and flour	112,949	90,345	87,524	102,245	27,438	133,425	255,528	311,283	325,689
New crop [1]	677,927	690,108	844,605	804,218	878,374	914,876	812,573	858,160	892,271
Imports (flour inluded) [5]	753	1,834	19,806	17,473	15,734	21,442	12,956	19,059	------
Total supply	791,629	782,287	951,935	923,936	1,021,546	1,069,743	1,081,057	1,188,502	------
DISTRIBUTION									
Exports and shipments:									
Exports (flour included) [5]	156,435	107,103	257,030	207,237	206,259	163,687	153,245	131,536	------
Reexports (flour included) [5]	399	195	562	221	53	55	72	20	------
Shipments (flour included to Alaska, Hawaii, and Porto Rico) [5]	2,034	2,549	2,546	2,836	2,690	3,172	2,977	2,850	------
Total	158,868	109,847	260,138	210,294	209,002	166,914	156,294	134,406	------
Seed requirements [6]	70,444	72,326	88,312	82,171	90,383	83,582	82,965	77,198	------
Disappearance for food, feed, and waste	462,221	501,768	514,354	534,040	588,736	563,719	543,015	651,209	------
Carry-over, June 30 [7]	100,096	98,346	89,131	97,431	133,425	255,528	298,783	325,689	------
Total distribution	791,629	782,287	951,935	923,936	1,021,546	1,069,743	1,081,057	1,188,502	------
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
Population, Jan. 1 [8]	82,614	94,378	102,880	112,696	119,029	120,694	122,359	124,000	------
	Bushels	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*Bushels*
Per capita disappearance:									
For food, feed, and waste	5.595	5.317	5.000	4.739	4.946	4.671	4.438	5.252	------
For food, feed, seed, and waste	6.448	6.083	5.858	5.468	5.705	5.363	5.116	5.874	------

Bureau of Agricultural Economics. Compiled as follows:
[1] Based on returns to the bureau from crop reporters.
[2] From Bradstreet's visible supply 1899–1900 to 1925–26. Bureau of Agricultural Economics, 1927–28 to 1931–32.
[3] Bureau of the Census figures raised to represent all merchant mills.
[4] From Chicago Daily Trade Bulletin.
[5] From reports of Foreign and Domestic Commerce of the United States.
[6] Amount of seed used per acre from returns to the bureau from inquiries sent to crop reporters.
[7] For individual items see above.
[8] Bureau of the Census.

TABLE 18.—*Wheat: Production, 1923-24 to 1931-32, exports, and weighted average price per bushel of representative grades by classes, 1923–24 to 1930–31*

Year beginning July	Estimated production [1]								
	Hard red spring	Durum	Hard red winter	Soft red winter	White [2]	Mixed [3]	Flour as wheat	Other wheat	Total
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1923-24	126, 876	55, 269	241, 851	271, 631	101, 767				797, 394
1924-25	192, 341	66, 105	364, 662	189, 441	51, 879				864, 428
1925-26	156, 053	65, 008	206, 135	169, 792	79, 777				676, 765
1926-27	121, 078	47, 575	360, 440	228, 886	73, 402				831, 381
1927-28	201, 927	83, 162	317, 042	180, 887	95, 356				878, 374
1928-29	203, 071	102, 286	384, 014	139, 665	85, 840				914, 876
1929-30	144, 821	59, 297	374, 572	163, 407	70, 476				812, 573
1930-31	153, 958	66, 979	388, 974	173, 101	75, 148				858, 160
1931-32	61, 894	22, 873	500, 776	245, 915	60, 813				892, 271
	Inspections for export and other exports of domestic wheat and flour [4]								
1923-24	1, 022	4, 908	19, 640	9, 810	18, 653	5, 435	81, 087	19, 325	159, 880
1924-25	16, 760	5, 945	90, 840	6, 944	10, 063	9, 386	65, 313	55, 552	260, 803
1925-26	3, 338	4, 170	7, 358	2, 282	16, 914	5, 944	44, 846	23, 183	108, 035
1926-27	1, 829	611	66, 874	29, 980	26, 615	1, 398	62, 910	28, 943	219, 160
1927-28	5, 209	3, 496	41, 603	9, 915	28, 150	1, 874	60, 260	55, 752	206, 259
1928-29	1, 766	1, 045	30, 660	2, 782	14, 710	1, 473	60, 574	50, 677	163, 687
1929-30	1, 490	360	49, 290	2, 547	17, 527	751	61, 070	20, 210	153, 245
1930-31	462	712	44, 328	2, 495	13, 292	192	55, 259	14, 796	131, 536
	Average price per bushel [5]								
	Cents	*Cents*	*Cents*	*Cents*					
1923-24	124	106	105	107					
1924-25	158	156	135	159					
1925-26	165	144	163	169					
1926-27	151	155	135	138					
1927-28	141	132	135	149					
1928-29	126	113	112	139					
1929-30	129	119	120	130					
1930-31	82	78	76	83					

Bureau of Agricultural Economics. Estimated production by classes based on questionnaire surveys of local authorities; supplemented by judgment of cereal specialists. Inspections of United States wheat for export data furnished monthly by Federal grain supervision officers at the export markets. Inspections are made at the ports of export. Export figures from reports of the Bureau of Foreign and Domestic Commerce.

[1] Production estimates are based on the estimate of percentage classification by States as reported for 1920-21, 1923-24, and 1924-25; the percentages for 1921-22 and 1922-23 were interpolated from the 1920-21 and 1923-24 percentages. The estimated production for 1930-31 and 1931-32 is subject to revision.

[2] White wheat in the Pacific Northwest region consists of both spring and winter wheat; no attempt has been made to classify this wheat as other than white wheat, part of which is spring and part winter.

[3] Mixed wheats exported from Atlantic coast ports are estimated as approximately 70 per cent durum and the remainder as hard red spring; that exported from Gulf ports as approximately half and half hard and soft winter; and that exported from Pacific coast ports as approximately 90 per cent white and the remainder as hard and soft red winter wheats.

[4] Designations by classes include all inspections for export. Flour as wheat is as reported by customs offices. "Other wheat" comprises total domestic exports as reported by customs offices minus "inspections for export" and consists principally of exports through Canada from customs districts of Buffalo, Chicago, Duluth-Superior, Ohio, and Wisconsin.

[5] The representative grades and markets selected are No. 1 Dark Northern Spring, Minneapolis; No. 2 amber durum, Minneapolis; No. 2 hard winter, Kansas City; and No. 2 red winter, St. Louis.

TABLE 19.—*Wheat including flour, in terms of grain: International trade, average 1925–26 to 1929–30, annual 1927–28 to 1930–31*

Country	Year beginning July									
	Average 1925–26 to 1929–30		1927–28		1928–29		1929–30		1930–31 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Canada	307, 640	796	305, 658	476	422, 732	1, 331	184, 213	1, 392	267, 365	243
United States	170, 077	15, 815	206, 259	15, 734	163, 687	21, 442	153, 245	12, 956	131, 536	19, 059
Argentina	159, 377	[2] 10	168, 214	2	227, 059	-------	161, 265	-------	120, 510	-------
Australia	83, 268	3	72, 962	1	107, 785	4	61, 776	3	143, 295	-------
Hungary	23, 539	8	22, 135	2	23, 658	1	31, 415	3	18, 425	2
Russia	[3] 20, 319	0	4, 866	0	124	0	-------	0	-------	0
Yugoslavia	10, 822	5	1, 024	0	7, 919	27	23, 593	0	[4] 4, 930	-------
British India	10, 080	8, 636	15, 668	2, 310	5, 716	27, 549	6, 798	8, 646	10, 197	10, 618
Rumania	6, 528	79	8, 067	24	[4] 1, 583	[4] 0	[4] 2, 561	[4] 66	[4] 14, 793	-------
Algeria	5, 162	[3] 2, 104	6, 351	1, 569	5, 904	2, 080	5, 363	-------	-------	-------
Tunis	3, 518	669	629	1, 144	5, 431	285	6, 120	164	6, 286	909
Bulgaria	1, 869	[5] 1, 804	2, 125	-------	760	-------	96	1, 804	5, 041	0
Chile	925	456	585	622	757	116	1, 063	54	1, 193	-------
Total	803, 124	30, 385	814, 543	21, 884	973, 115	53, 835	637, 508	25, 088	723, 571	30, 831
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom	11, 369	215, 665	11, 181	222, 270	11, 158	215, 138	10, 795	212, 698	10, 064	230, 900
Germany	11, 527	85, 668	6, 784	98, 557	17, 664	86, 162	7, 203	67, 958	825	30, 853
Italy	2, 014	76, 212	1, 108	87, 905	2, 184	91, 930	3, 273	46, 700	2, 628	86, 235
France	4, 170	46, 574	132	53, 877	116	50, 665	18, 055	38, 471	22, 128	66, 943
Belgium	2, 452	43, 482	2, 618	44, 848	2, 542	44, 061	2, 018	44, 541	3, 110	48, 244
Brazil	0	32, 839	0	34, 653	0	36, 244	0	33, 889	0	30, 708
Netherlands	943	30, 050	586	31, 532	709	29, 518	856	30, 992	1, 428	36, 830
China [6]	1, 862	23, 486	1, 464	15, 464	4, 265	20, 328	1, 865	49, 123	59	22, 021
Japan	5, 989	23, 158	4, 859	21, 995	10, 768	28, 203	5, 403	19, 156	7, 953	25, 343
Greece	0	20, 055	0	19, 106	0	22, 144	0	21, 521	0	24, 081
Czechoslovakia	418	18, 604	41	21, 323	56	17, 248	1, 694	13, 980	1, 751	17, 063
Irish Free State	[3] 74	18, 502	56	18, 691	110	17, 853	-------	17, 915	-------	18, 996
Switzerland	0	16, 461	0	18, 427	0	15, 496	1	16, 915	4	18, 393
Austria	116	16, 275	165	16, 230	59	14, 903	132	18, 530	267	15, 666
Egypt	162	10, 448	433	6, 752	181	12, 906	108	11, 202	24	9, 702
Denmark	524	10, 102	220	10, 701	110	17, 149	310	8, 080	112	11, 523
Sweden	2, 004	9, 092	1, 660	10, 391	3, 076	10, 553	2, 068	9, 355	72	5, 509
Norway	-------	6, 964	-------	6, 862	-------	8, 538	-------	7, 130	-------	8, 274
Union of South Africa	253	6, 317	223	8, 215	261	8, 148	327	5, 036	173	3, 631
Cuba	0	[3] 5, 685	0	5, 740	0	5, 531	0	-------	0	-------
Finland	0	5, 390	0	5, 499	0	6, 095	0	5, 623	0	4, 878
Spain	526	5, 189	406	2, 220	366	17, 244	188	4, 959	-------	-------
Poland	1, 407	4, 820	225	7, 840	106	3, 865	790	602	4, 286	286
Syria and Lebanon [4]	[2] 14	2, 710	15	1, 853	7	5, 358	22	1, 304	290	458
Latvia [4]	-------	2, 027	0	1, 507	0	2, 861	0	2, 520	0	1, 944
New Zealand	45	1, 658	1	1, 032	4	792	217	719	1	752
Indo-China [4]	0	1, 177	0	1, 233	0	1, 206	0	1, 211	0	1, 008
Estonia	0	1, 062	0	1, 062	0	1, 176	0	1, 218	0	880
Total	45, 869	739, 672	32, 177	775, 785	53, 742	791, 315	55, 325	691, 348	55, 175	721, 121

Bureau of Agricultural Economics, official sources except where otherwise noted.

[1] Preliminary.
[2] 3-year average.
[3] 4-year average.
[4] Monthly Crop Report and Agricultural Statistics.
[5] 1 year only.
[6] Calendar year.

TABLE 20.—*Wheat, all: Estimated average price per bushel received by producers, United States, 1922–23 to 1931–32*

Crop year	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Weighted average
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
1922–23	99.8	92.6	89.2	94.1	99.4	103.2	104.6	104.4	106.0	108.4	108.2	100.8	98.0
1923–24	89.6	86.4	91.0	94.2	93.7	94.5	96.7	98.0	98.8	95.8	96.8	98.5	92.4
1924–25	105.8	116.8	114.2	129.7	133.6	141.1	162.1	169.8	164.0	140.5	149.1	152.7	127.8
1925–26	140.3	150.4	144.4	136.4	148.8	153.7	158.1	155.5	146.0	142.2	142.1	138.9	145.9
1926–27	127.7	125.1	117.7	121.4	123.6	122.8	122.2	122.8	120.9	117.2	123.2	130.1	123.8
1927–28	127.3	123.5	119.2	113.7	111.4	113.9	115.2	116.2	121.6	129.2	144.3	132.0	120.5
1928–29	118.1	95.2	94.4	98.7	97.1	98.2	98.5	104.2	104.7	99.8	90.1	86.8	100.1
1929–30	102.4	110.7	112.1	111.5	103.4	108.1	107.5	101.3	91.9	93.4	87.5	87.9	105.1
1930–31	70.6	74.0	70.3	65.6	60.0	61.3	59.1	58.7	58.3	59.2	59.9	51.9	66.4
1931–32	36.3	35.4	35.7	36.1	50.5	44.1	------	------	------	------	------	------	--------

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on 1st of month and 1st of succeeding month, July, 1922–December, 1923.

TABLE 21.—*Wheat: Weighted average price*[1] *per bushel of reported cash sales at Minneapolis and St. Louis, 1922–23 to 1931–32*

Grade, market, and crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Weighted average
No. 1 northern spring, Minneapolis:	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	149	111	110	115	123	125	123	126	124	130	128	117	120
1923–24	112	118	121	120	114	116	119	121	121	121	122	125	117
1924–25	137	131	130	146	148	166	189	187	171	150	167	164	156
1925–26	159	164	150	149	155	169	173	167	161	164	162	163	161
1926–27	172	149	143	149	146	146	143	142	139	138	147	149	146
1927–28	147	143	134	129	130	132	135	134	139	153	157	148	136
1928–29	138	119	119	116	116	115	121	128	125	120	111	115	118
1929–30	143	135	135	131	128	131	127	125	112	111	107	100	133
1930–31	92	91	87	82	75	77	76	75	76	79	81	74	83
1931–32	61	65	69	71	80	73	------	------	------	------	------	------	--------
No. 2 red winter, St. Louis:													
1922–23	112	109	114	123	129	136	137	139	136	139	133	123	121
1923–24	97	99	109	116	112	114	116	118	114	113	112	116	107
1924–25	135	138	140	156	163	179	210	202	186	177	186	189	159
1925–26	159	172	171	170	171	184	194	185	170	171	162	147	169
1926–27	142	134	136	140	136	137	138	135	130	129	142	150	138
1927–28	141	142	142	145	141	144	151	156	169	196	196	179	149
1928–29	147	138	145	144	145	139	142	140	135	125	117	121	139
1929–30	139	132	135	132	129	135	134	123	118	117	114	105	130
1930–31	85	89	88	87	83	83	78	79	78	80	79	72	83
1931–32	48	47	47	52	62	57	------	------	------	------	------	------	--------
No. 2 amber durum, Minneapolis:													
1922–23	122	102	98	101	111	110	108	107	111	117	112	104	107
1923–24	96	96	99	104	103	104	113	115	118	114	115	118	106
1924–25	127	129	129	161	164	176	215	210	202	176	180	162	156
1925–26	164	150	130	129	143	156	157	151	144	149	147	150	144
1926–27	154	153	138	150	161	174	168	160	157	154	158	157	155
1927–28	153	140	128	123	128	133	130	129	133	141	140	131	132
1928–29	123	108	106	112	114	110	127	129	124	118	108	115	113
1929–30	135	127	128	125	119	123	119	111	97	99	97	88	119
1930–31	87	86	79	78	70	74	72	73	72	73	77	64	78
1931–32	61	73	73	79	87	84	------	------	------	------	------	------	--------

Bureau of Agricultural Economics. Compiled from Minneapolis Daily Market Record and St. Louis Daily Market Reporter.

[1] Average of daily prices weighted by car-lot sales.

TABLE 22.—*Wheat: Weighted average price*[1] *per bushel of reported cash sales of all classes and grades, six markets combined, 1922–23 to 1931–32*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	116.1	105.9	102.7	108.8	116.3	117.8	115.6	116.1	117.0	122.0	117.9	109.5	112.4
1923–24	99.0	101.8	106.8	110.4	105.7	105.0	110.3	111.8	111.6	109.9	110.5	116.6	107.0
1924–25	125.7	123.5	128.3	144.8	148.2	163.6	188.8	184.8	172.1	150.8	165.5	161.6	145.3
1925–26	155.7	160.5	144.8	143.3	153.5	165.7	170.3	164.8	154.9	156.0	153.8	151.6	155.0
1926–27	141.6	135.3	135.6	139.4	137.7	139.5	138.8	136.2	133.6	134.7	145.1	148.6	138.3
1927–28	138.7	136.4	128.7	125.1	125.6	128.0	131.0	132.0	136.6	150.7	151.4	141.8	132.9
1928–29	126.0	109.4	108.9	107.0	109.1	107.4	113.7	118.1	114.2	109.2	101.1	105.3	110.6
1929–30	129.8	125.7	127.4	123.7	121.2	123.5	121.6	115.8	103.9	102.5	100.9	94.1	121.9
1930–31	82.6	84.7	79.0	76.0	69.8	72.5	71.4	70.9	71.4	74.5	75.5	66.8	77.1
1931–32	46.5	50.6	55.7	58.4	68.7	60.0	------	------	------	------	------	------	---------

Bureau of Agricultural Economics. Compiled from daily trade papers of markets named. The markets are Chicago, Minneapolis, Kansas City, St. Louis, Omaha, and Duluth.

[1] Average of daily prices weighted by car-lot sales. The prices in this table are comparable with prices paid to producers, in that the latter are averages of the several prices reported which cover all classes and grades sold by producers.

TABLE 23.—*Wheat, No. 2 hard winter: Weighted average price*[1] *per bushel of reported cash sales at Kansas City, 1899–1900 to 1931–32*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1899–1900	66	65	65	65	63	64	63	64	64	64	62	66	65
1900–01[2]	69	66	67	68	67	66	68	68	69	70	70	67	68
1901–02[2]	63	67	66	66	69	75	79	75	72	72	74	70	68
1902–03	70	66	67	67	67	67	67	68	68	68	69	73	68
1903–04	70	73	73	73	72	71	75	87	89	89	92	89	77
1904–05	87	94	103	106	105	105	107	109	104	93	101	100	97
1905–06	84	80	78	80	81	81	81	78	76	79	80	78	80
1906–07	71	68	66	69	69	70	71	72	71	73	90	91	72
1907–08	87	86	93	100	96	97	100	95	98	97	100	97	93
1908–09	97	95	98	99	102	103	106	110	115	130	138	137	99
1909–10	114	102	102	106	104	110	111	111	110	108	107	108	107
1910–11	104	100	99	95	91	93	95	90	88	88	90	88	98
1911–12	87	93	95	104	100	100	105	103	105	109	111	109	97
1912–13	92	89	88	88	83	84	87	86	86	88	87	88	88
1913–14	82	83	87	84	83	84	85	86	88	87	90	85	84
1914–15	78	91	104	102	108	113	134	154	149	154	150	121	105
1915–16	136	126	107	107	103	112	120	120	105	112	110	100	119
1916–17	114	141	157	167	185	172	189	182	197	243	301	274	171
1917–18	268	261	212	212	212	212	212	212	212	212	212	------	---------
1918–19	220	216	216	216	215	224	231	226	239	262	260	247	219
1919–20	225	218	224	230	246	263	282	242	249	275	293	276	242
1920–21	268	245	244	207	176	169	172	162	155	133	147	138	183
1921–22	118	115	122	110	109	109	113	129	134	135	134	117	120
1922–23	113	104	104	113	117	117	114	115	116	120	116	104	113
1923–24	96	101	109	112	109	109	113	111	109	104	106	108	105
1924–25	120	119	120	137	143	162	182	181	171	151	163	160	135
1925–26	154	164	158	158	163	172	178	171	161	159	155	153	163
1926–27	137	131	132	139	137	138	137	135	133	131	142	144	135
1927–28	136	135	131	128	131	132	133	133	138	152	160	147	135
1928–29	120	106	107	110	112	111	114	118	116	110	101	105	112
1929–30	125	123	124	122	119	121	119	113	102	101	99	89	120
1930–31	80	81	78	74	69	71	69	69	70	93	73	68	76
1931–32	44	43	43	48	59	52	------	------	------	------	------	------	---------

Bureau of Agricultural Economics. Compiled from Kansas City Grain Market Review, formerly Daily Price Current.

[1] Average of daily prices weighted by car-lot sales.
[2] Calendar year 1901, compiled from Kansas City Daily Star.

TABLE 24.—*Wheat, No. 3 Manitoba Northern: Average cash price per bushel at Winnipeg, in terms of United States money, 1921–22 to 1931–32* [1]

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1921–22	156	150	125	100	93	94	95	118	124	126	130	117	119
1922–23	120	107	95	96	105	104	103	105	105	113	111	108	106
1923–24	99	103	96	89	87	83	86	90	88	89	92	105	92
1924–25	126	134	136	150	153	161	184	187	167	149	174	162	157
1925–26	153	160	132	120	136	149	146	144	138	146	144	144	143
1926–27	149	138	133	136	131	123	123	127	130	133	146	149	135
1927–28	153	145	131	127	124	124	123	124	131	141	142	130	133
1928–29	120	108	106	111	111	109	112	120	119	115	107	112	113
1929–30	152	152	144	134	126	130	123	110	100	103	104	98	123
1930–31	90	88	74	68	60	48	47	53	50	54	53	53	62
1931–32	49	46	43	45	52	43	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled as follows: July, 1921–July, 1928, Reports on the Grain Trade of Canada; August, 1928, to latest date shown, Minneapolis Daily Market Record. Conversions at current rate of exchange July, 1921–March, 1925, and September, 1931, to end of table; par rate used April, 1925–August, 1931. Rates are monthly averages as reported by the Federal Reserve Board.

[1] Average of daily cash closing prices, basis, in store at Fort William and Port Arthur.

TABLE 25.—*Wheat: Average spot price per bushel of imported wheat at Liverpool, 1914–15 to 1931–32*

IMPORTED RED

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1914–15	105	128	129	128	138	147	167	195	191	194	198	165	157
1915–16	163	161	167	171	159	173	194	190	200	193	171	155	175
1916–17	158	196	200	215	222	239	239	243	242	246	246	246	224
1917–18	250	250	238	226	226	226	232	232	239	232	232	232	235
1918–19	232	232	232	239	246	246	246	246	243	241	241	239	240
1919–20	229	221	216	216	211	195	190	175	211	237	234	240	215
1920–21	234	220	213	234	253	230	233	214	213	213	217	[1] 196	223
1921–22	[1] 171	[1] 159	[1] 156	[1] 131	[1] 126	[1] 137	144	166	162	158	160	143	151
1922–23	152	137	132	148	148	148	148	143	140	145	149	138	144
1923–24	138	132	125	126	126	125	126	(2)	128	123	125	126	------
1924–25	143	160	163	176	179	189	210	214	198	175	184	182	181
1925–26	176	188	180	166	171	189	183	181	164	167	173	172	176

PARCELS

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
1925–26	169	173	160	149	165	185	181	175	161	171	173	169	169
1926–27	167	162	160	171	171	163	160	157	155	156	165	165	163
1927–28	161	160	151	149	147	148	149	146	151	159	155	147	152
1928–29	141	126	126	129	129	126	131	135	131	125	116	117	128
1929–30	141	142	137	136	125	141	140	124	119	120	114	110	129
1930–31	106	105	92	86	81	74	68	70	67	71	72	67	80
1931–32	62	53	53	59	64	57	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Price per bushel of 60 pounds, good average imported red, July, 1914–June, 1926, compiled from Broomhall's 1921, 1925, and 1927 Corn Trade Yearbooks. Parcels price per bushel of 60 pounds July, 1925, to date, compiled from Broomhall's Corn Trade News. These prices are simple averages of daily sales prices of parcels at Liverpool. Conversions at par from January, 1926, to August, 1931, inclusive. Prior to January 1926, and beginning with September, 1931, conversions were made at monthly average of current rates of exchange as given in Federal Reserve Bulletins.

[1] No. 2 hard winter when available, otherwise No. 2 red winter. [2] No quotations.

TABLE 26.—*Flour, wheat, spring patents: Average wholesale price per barrel,*[1] *Minneapolis, 1922–23 to 1931–32*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	7.95	7.22	6.68	6.76	6.88	6.86	6.71	6.72	6.72	7.00	6.80	6.35	6.89
1923–24	6.21	6.37	6.45	6.43	6.21	6.30	6.44	6.51	6.49	6.56	6.83	7.12	6.49
1924–25	7.72	7.69	7.52	8.19	8.22	9.03	9.80	10.02	9.34	8.54	9.12	8.86	8.67
1925–26	8.78	9.04	8.52	8.52	8.81	9.52	9.85	9.46	9.19	9.20	9.00	9.32	9.10
1926–27	9.27	8.50	7.87	8.08	7.85	8.02	7.95	7.85	7.74	7.75	8.23	8.39	8.12
1927–28	8.26	7.98	7.52	7.43	7.38	7.37	7.48	7.47	7.88	8.48	8.68	8.36	7.86
1928–29	7.92	7.20	7.16	6.89	6.79	6.64	6.84	7.27	7.29	7.22	6.82	6.94	7.08
1929–31	8.57	8.10	7.94	7.53	7.44	7.69	7.44	7.06	6.86	6.81	6.58	6.47	7.37
1930–31	6.12	5.94	5.67	5.51	5.18	5.30	5.37	5.40	5.21	5.25	5.41	5.16	5.46
1931–32	4.76	4.72	4.81	4.90	5.28	5.08	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from the Minneapolis Daily Market Record. Prices 1909–1921, appear in 1930 yearbook, Table 25.

[1] Packed in 98-pound cotton sacks.

TABLE 27.—*Bread: Average retail price per pound (baked weight) in leading cities of the United States, 1922–23 to 1931–32*

Year	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	8.8	8.7	8.7	8.7	8.7	8.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7
1923–24	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7
1924–25	8.7	8.8	8.8	8.8	8.9	8.9	9.2	9.5	9.4	9.4	9.4	9.4	9.1
1925–26	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
1926–27	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.3	9.4
1927–28	9.3	9.3	9.3	9.3	9.3	9.2	9.2	9.2	9.1	9.1	9.1	9.2	9.2
1928–29	9.2	9.2	9.1	9.1	9.1	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.1
1929–30	9.0	9.0	9.0	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.8	8.8	8.9
1930–31	8.8	8.7	8.7	8.6	8.5	8.5	8.2	8.0	7.9	7.7	7.7	7.6	8.2
1931–32	7.5	7.4	7.3	7.3	7.3	7.2	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from Bureau of Labor Statistics retail prices, monthly Data for 1913–14 to 1921–22 are available in the 1930 Yearbook, p. 615, Table 26.

TABLE 28.—*Bran, standard: Average wholesale price per ton in 100-pound sacks, Minneapolis, 1922–23 to 1931–32*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	15.31	14.06	16.88	21.81	22.65	24.09	25.99	27.34	28.22	27.74	26.75	20.83	22.64
1923–24	19.84	23.62	27.79	28.07	25.65	24.77	24.98	23.66	22.00	20.84	17.66	19.12	23.17
1924–25	22.27	23.43	23.00	24.66	25.62	30.43	30.14	24.49	23.45	23.46	26.84	26.34	25.34
1925–26	23.58	24.20	23.09	22.83	25.73	26.34	26.17	23.68	22.24	25.05	23.30	21.31	23.96
1926–27	22.02	21.69	21.64	21.33	23.14	26.02	26.48	27.64	26.96	27.31	28.43	26.51	24.93
1927–28	25.13	26.85	25.88	25.96	28.41	30.09	30.66	32.47	35.68	34.28	35.03	29.68	30.01
1928–29	27.29	24.12	25.49	28.09	30.82	31.69	30.54	28.64	26.88	22.93	22.38	22.56	26.79
1929–30	26.17	26.44	29.19	28.21	27.90	27.66	26.58	24.45	23.17	27.43	25.06	21.25	26.13
1930–31	19.33	24.17	21.43	19.91	17.97	16.57	15.61	14.66	17.87	19.02	14.15	11.38	17.67
1931–32	10.30	10.55	10.02	9.93	14.17	13.04	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from the Minneapolis Daily Market Record. Prices are simple averages of daily quotations.

TABLE 29.—*Middlings, standard: Average wholesale price per ton, in 100-pound sacks, Minneapolis, 1922–23 to 1931–32*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	17.30	16.24	18.03	13.06	23.23	23.73	25.81	27.26	28.11	27.79	28.85	25.69	23.76
1923–24	24.83	25.89	27.85	27.78	25.13	23.80	25.43	23.95	21.65	20.96	18.00	19.92	23.78
1924–25	24.46	25.68	25.27	26.64	27.99	31.44	33.08	26.09	23.62	24.28	29.07	29.68	27.28
1925–26	25.53	26.95	26.37	24.19	26.31	25.28	26.10	23.71	22.03	24.20	21.77	21.60	24.50
1926–27	22.96	23.01	22.67	22.31	24.16	27.38	27.35	28.61	28.46	27.79	29.13	29.10	26.08
1927–28	31.42	34.46	29.22	26.88	28.72	30.00	30.52	32.71	35.85	34.33	37.14	35.30	32.21
1928–29	32.18	24.31	27.44	28.61	31.01	31.21	30.46	28.31	26.28	22.76	21.98	22.64	27.27
1929–30	28.42	29.25	32.66	32.08	28.76	28.00	26.46	24.11	22.71	26.74	25.21	22.09	27.21
1930–31	20.64	25.10	22.17	19.55	17.49	16.00	14.85	13.52	17.36	18.52	13.85	11.95	17.58
1931–32	11.06	10.35	10.35	10.02	14.40	13.03	-------	-------	-------	-------	-------	-------	------

Bureau of Agricultural Economics. Compiled from the Minneapolis Daily Market Record. Prices are simple averages of daily quotations.

TABLE 30.—*Wheat: Volume of trading in futures, all contract markets, by months, 1923–24 to 1930–31*

Months	1923–24	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31
	Million bushels	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*
July	806	1,333	1,460	1,438	1,018	996	2,889	1,306
August	784	1,300	1,561	1,226	1,144	1,133	2,265	1,531
September	678	1,068	1,475	1,156	923	818	1,401	1,216
October	785	1,596	1,573	1,090	918	916	1,738	1,160
November	677	1,340	1,500	1,227	838	750	1,805	1,094
December	528	1,528	2,349	972	543	517	1,608	529
January	373	1,908	1,456	704	384	1,085	1,334	347
February	417	1,781	1,284	581	508	892	1,484	369
March	594	2,273	1,864	920	923	1,083	1,201	433
April	451	1,482	1,397	846	1,590	1,361	1,501	706
May	374	1,508	1,222	1,260	1,471	1,253	1,004	635
June	850	1,759	1,204	1,164	941	1,391	1,377	737
Total	7,317	18,876	18,345	12,584	11,201	12,195	19,607	10,063

Grain futures administration.

TABLE 31.—*Wheat: Volume of trading in futures, contract markets, by markets and by months, 1930–31*

Month	Chicago Board of Trade	Chicago Open Board	Minneapolis	Kansas City	Duluth	St. Louis	Milwaukee	Seattle	Portland	Omaha	New York
	Million bushels	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*
July	1,129	32	50	79	12	1	2	1	½	(1)	(2)
August	1,264	35	104	82	40	1	2	1	2	-------	-------
September	1,012	32	74	58	35	½	2	1	1	-------	-------
October	967	34	74	54	27	2	1	1	½	-------	-------
November	888	24	82	66	28	2	2	1	1	-------	-------
December	419	9	45	39	15	¼	1	½	1	-------	-------
January	289	12	18	13	10	¼	½	1	2	1	-------
February	320	13	14	12	6	-------	1	1	1	1	-------
March	365	16	16	15	6	-------	½	1	1	3	8
April	559	31	47	36	20	2	1	1	1	1	8
May	535	29	18	24	9	¼	1	2	2	9	6
June	613	30	39	38	12	¼	1	-------	¼	-------	3
Total	8,360	297	581	516	220	9	15	12	13	15	25

Grain Futures Administration.

[1] Trading in Omaha started in June. Less than 100,000 bushels previous to January.
[2] Trading in New York started in March.

TABLE 32.—*Wheat: Amount of open commitments in the various futures on the Chicago Board of Trade, semimonthly, June 30, 1930—June 30, 1931*

Date	Future						
	July	September	December	March	May	June	All futures
1930	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*
June 30	14	56	35				105
July 15	4	61	44				110
July 31		66	57	3			126
Aug. 15		41	86	7	9		143
Aug. 29		14	98	9	21		142
Sept. 15		3	109	12	39		162
Sept. 30			99	14	54		167
Oct. 15	2		93	15	64		174
Oct. 31	2		89	17	77		185
Nov. 15	4		67	18	95		184
Nov. 29	10		29	18	104		161
Dec. 15	17		5	16	117		155
Dec. 31	27			11	106		145
1931							
Jan. 15	28			9	95		132
Jan. 31	30			10	94		134
Feb. 14	28	4		9	91		133
Feb. 28	32	7		10	86		135
Mar. 16	34	10		4	82		130
Mar. 31	37	14			76	1	127
Apr. 15	35	16	3		71	1	126
Apr. 30	35	21	7		51	1	115
May 15	33	22	8		28	1	93
May 29	32	26	12			1	70
June 15	31	30	16			1	78
June 30	18	40	21				79

Grain Futures Administration.

TABLE 33.—*Wheat: Volume of trading in futures on the Chicago Board of Trade, by crop years, 1921–22 to 1930–31*

Crop year	Quantity	Crop year	Quantity	Crop year	Quantity
	Bushels		*Bushels*		*Bushels*
1921–22	12, 814, 000, 000	1925–26	15, 869, 000, 000	1929–30	16, 599, 000, 000
1922–23	9, 625, 000, 000	1926–27	10, 619, 000, 000	1930–31	8, 360, 000, 000
1923–24	6, 124, 000, 000	1927–28	9, 203, 000, 000		
1924–25	16, 587, 000, 000	1928–29	9, 908, 000, 000		

Grain Futures Administration.

TABLE 34.—*Rye: Acreage, production, value, exports, etc., United States, 1909–1931*

Year	Acreage harvested	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Price per bushel of No. 2 rye at Minneapolis year beginning July [1]	Foreign trade, including flour, year beginning July [2]			
							Domestic exports	Imports	Net exports [3]	
									Total	Percentage of production
	1,000 acres	*Bushels of 56 lbs.*	*1,000 bushels*	*Cents*	*1,000 dollars*	*Cents*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*Per cent*
1909	*2,196*	*13.4*	*29,520*	---	---	---	---	---	---	---
1909	2,196	16.1	35,406	72.2	25,548	70	242	30	212	0.6
1910	2,185	16.0	34,897	71.5	24,953	77	40	227	[4] 187	.5
1911	2,127	15.6	33,119	83.2	27,557	86	31	134	[4] 103	.3
1912	2,117	16.8	35,664	66.3	23,636	60	1,855	1	1,854	5.2
1913	2,557	16.2	41,381	63.4	26,220	58	2,273	37	2,236	5.4
1914	2,541	16.8	42,779	86.5	37,018	98	13,027	147	12,880	30.1
1915	3,129	17.3	54,050	83.4	45,083	94	15,250	566	14,684	27.2
1916	3,213	15.2	48,862	122.1	59,676	135	13,703	428	13,275	27.2
1917	4,317	14.6	62,933	166.0	104,447	193	17,186	834	16,352	26.0
1918	6,391	14.2	91,041	151.6	138,038	158	36,467	638	35,829	39.4
1919	*7,679*	*9.9*	*75,992*	---	---	---	---	---	---	---
1919	7,129	10.6	75,308	133.1	100,206	160	41,531	1,077	40,454	53.7
1920	4,799	13.0	62,342	125.6	78,329	161	47,337	452	46,885	75.2
1921	4,824	12.7	61,070	68.2	41,644	92	29,944	700	29,244	47.9
1922	6,757	15.5	104,700	67.6	70,777	75	51,663	99	51,564	49.2
1923	4,858	11.1	53,870	61.9	33,335	65	19,902	2	19,900	36.9
1924	*3,744*	*14.9*	*55,674*	---	---	---	---	---	---	---
1924	3,868	14.9	57,672	106.3	61,282	114	50,242	1	50,241	87.1
1925	3,717	10.9	40,451	76.5	30,961	88	12,647	---	12,646	31.3
1926	3,350	9.8	32,884	81.9	26,937	98	21,698	1	21,697	66.0
1927	3,380	15.3	51,840	84.3	43,687	104	26,346	2	26,345	50.8
1928	3,232	11.6	37,556	84.4	31,687	95	9,488	1	9,487	25.3
1929	3,054	11.4	34,950	84.9	29,685	90	2,600	1	2,599	7.4
1930	3,543	12.8	45,379	38.4	17,419	51	227	88	139	.3
1931 [5]	3,143	10.4	32,746	38.7	12,673	---	---	---	---	---

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board, revised 1919 to 1928. See introductory text; italic figures are census returns. See 1927 Yearbook, page 764, for data for earlier years.

[1] Prices are from Minneapolis Daily Market Record and are averages of daily prices weighted by car-lot sales.

[2] Compiled from Commerce and Navigation of the United States, 1909–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1926; January and June issues, 1927–1931, and official records of the Bureau of Foreign and Domestic Commerce. Rye—General imports, 1909; imports for consumption, 1910–1931. Rye flour—Imports for consumption, 1909–1931. Rye flour converted to rye on the basis that 1 barrel of rye flour is the product of 6 bushels of grain.

[3] Total exports (domestic plus foreign) minus total imports.

[4] Net imports.

[5] Preliminary.

TABLE 35.—*Rye: Acreage harvested and production, by States, average 1924–1928, annual 1928–1931*

State and division	Acreage harvested					Production				
	Average, 1924–1928	1928	1929	1930	1931[1]	Average, 1924–1928	1928	1929	1930	1931[1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
New York	29	20	20	24	20	407	270	300	384	340
New Jersey	37	28	31	28	21	624	462	527	504	357
Pennsylvania	103	103	127	127	135	1, 392	1, 288	1, 651	1, 842	2, 025
North Atlantic	168	151	178	179	176	2, 422	2, 020	2, 478	2, 730	2, 722
Ohio	42	26	50	42	74	556	273	630	504	1, 332
Indiana	111	72	100	87	126	1, 341	720	1, 120	1, 088	1, 827
Illinois	60	46	48	58	64	873	667	696	870	992
Michigan	185	167	147	140	158	2, 501	2, 171	1, 632	1, 820	2, 133
Wisconsin	250	167	188	194	175	3, 065	1, 754	2, 256	2, 425	2, 188
Minnesota	465	421	412	424	365	7, 076	5, 684	6, 633	6, 869	5, 475
Iowa	39	49	45	45	41	619	760	698	720	615
Missouri	16	15	15	14	28	147	135	112	140	336
North Dakota	1, 333	1, 298	986	1, 223	819	16, 277	14, 278	9, 367	14, 064	4, 914
South Dakota	169	168	230	414	373	2, 049	1, 646	2, 714	6, 293	2, 723
Nebraska	210	230	244	317	333	2, 448	2, 875	2, 928	4, 121	2, 997
Kansas	32	20	14	18	25	362	310	147	189	300
North Central	2, 912	2, 679	2, 479	2, 976	2, 581	37, 314	31, 273	28, 933	39, 103	25, 832
Delaware	4	4	5	5	7	54	58	72	70	122
Maryland	16	16	19	19	21	226	192	238	285	378
Virginia	34	33	42	40	70	377	396	437	460	1, 141
West Virginia	12	10	11	11	16	126	115	106	126	259
North Carolina	58	51	54	49	64	442	382	432	392	576
South Carolina	8	8	7	7	8	71	68	63	56	76
Georgia	17	16	12	10	13	108	104	72	65	110
South Atlantic	148	138	150	141	199	1, 405	1, 315	1, 420	1, 454	2, 662
Kentucky	16	9	18	14	24	200	104	171	147	360
Tennessee	16	13	16	14	22	117	82	104	98	176
Oklahoma	17	9	8	7	9	147	72	71	70	117
Texas	4	3	3	2	3	41	34	42	20	46
South Central	53	34	45	37	58	505	292	388	335	699
Montana	65	90	67	68	20	888	1, 215	502	442	100
Idaho	3	4	4	4	3	41	58	44	48	30
Wyoming	45	34	32	30	25	353	272	294	255	112
Colorado	78	60	64	74	53	675	552	512	629	371
Utah	4	3	3	3	3	32	24	25	27	15
Washington	19	20	12	9	10	238	250	84	81	75
Oregon	14	19	20	22	15	206	285	270	275	128
Western	228	230	202	210	129	2, 433	2, 656	1, 731	1, 757	831
United States	3, 509	3, 232	3, 054	3, 543	3, 143	44, 081	37, 556	34, 950	45, 379	32, 746

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

[1] Preliminary.

TABLE 36.—*Rye: Yield per acre, average 1919–1928, annual 1926–1931, and estimated price per bushel December 1, average 1925–1929, and annual 1926–1931, by States*

State and division	Yield per acre							Estimated price per bushel Dec. 1						
	Av., 1919–1928	1926	1927	1928	1929	1930	1931	Av., 1925–1929	1926	1927	1928	1929	1930	1931
	Bus.	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
New York	14.2	12.5	15.0	13.5	15.0	16.0	17.0	106	100	105	112	114	74	53
New Jersey	16.4	17.5	18.0	16.5	17.0	18.0	17.0	98	95	97	104	103	70	53
Pennsylvania	13.6	13.5	13.5	12.5	13.0	14.5	15.0	104	97	105	107	106	79	51
North Atlantic	14.3	14.2	14.7	13.4	13.9	15.3	15.5	102.8	96.9	102.9	106.9	106.3	76.6	51.5
Ohio	12.7	15.0	13.5	10.5	12.6	12.0	18.0	94	88	92	103	98	67	39
Indiana	12.2	13.5	12.5	10.0	11.2	12.5	14.5	88	85	88	94	90	55	34
Illinois	15.2	15.0	14.5	14.5	14.5	15.0	15.5	90	86	92	92	89	53	38
Michigan	13.3	13.0	14.5	13.0	11.1	13.0	13.5	85	78	89	93	88	55	38
Wisconsin	12.4	11.5	12.7	10.5	12.0	12.5	12.5	86	84	90	90	89	45	44
Minnesota	15.8	10.0	19.5	13.5	16.1	16.2	15.0	80	76	85	85	82	31	35
Iowa	16.0	17.0	15.0	15.5	15.5	16.0	15.0	84	82	86	86	85	48	40
Missouri	9.3	10.0	8.0	9.0	7.5	10.0	12.0	111	113	110	106	107	77	43
North Dakota	11.3	7.6	16.7	11.0	9.5	11.5	6.0	74	73	80	76	76	24	28
South Dakota	12.8	6.2	18.5	9.8	11.8	15.2	7.3	75	73	79	79	76	25	33
Nebraska	11.2	9.0	13.0	12.5	12.0	13.0	9.0	75	76	77	77	76	38	33
Kansas	11.0	11.7	11.0	15.5	10.5	10.5	12.0	90	94	92	82	85	58	33
North Central	12.8	9.5	16.0	11.7	11.7	13.1	10.0	78.8	77.8	82.4	81.3	80.8	32.5	34.7
Delaware	13.4	15.0	15.0	14.5	14.5	14.0	17.5	116	110	115	120	115	90	51
Maryland	13.0	15.0	12.5	12.0	12.5	15.0	18.0	111	105	110	115	110	87	50
Virginia	10.4	12.0	10.5	12.0	10.4	11.5	16.3	119	112	115	120	120	115	55
West Virginia	10.5	11.0	11.0	11.5	9.6	11.5	16.2	114	110	110	115	116	96	52
North Carolina	7.0	8.0	8.0	7.5	8.0	8.0	9.0	140	125	135	145	140	123	71
South Carolina	8.1	10.0	10.0	8.5	9.0	8.0	9.5	187	175	175	185	190	168	92
Georgia	6.2	7.5	6.5	6.5	6.0	6.5	8.5	174	160	165	175	189	161	97
South Atlantic	8.9	10.0	9.4	9.5	9.5	10.3	13.4	131.6	121.9	128.8	133.8	130.5	112.9	60.1
Kentucky	11.2	14.5	10.5	11.5	9.5	10.5	15.0	121	108	120	132	122	96	53
Tennessee	6.8	9.6	5.6	6.3	6.5	7.0	8.0	130	120	129	138	133	108	65
Oklahoma	8.5	11.0	8.5	8.0	8.9	10.0	13.0	96	90	99	92	90	68	40
Texas	10.0	15.5	7.0	11.5	14.0	10.0	15.5	101	97	95	103	92	66	41
South Central	9.0	12.2	8.1	8.6	8.6	9.1	12.1	114.1	105.4	116.0	120.2	116.0	91.9	53.1
Montana	11.7	12.0	17.0	13.5	7.5	6.5	5.0	73	75	73	69	72	25	35
Idaho	12.6	12.5	11.0	14.5	11.0	12.0	10.0	77	73	75	72	85	50	45
Wyoming	8.2	8.0	7.5	8.0	9.2	8.5	4.5	68	67	69	72	68	33	40
Colorado	9.3	9.0	9.5	9.2	8.0	8.5	7.0	70	71	70	70	71	37	31
Utah	9.2	10.5	9.0	8.0	8.4	9.0	5.0	88	80	82	87	91	60	62
Washington	11.7	12.0	16.0	12.5	7.0	9.0	7.5	100	100	90	90	95	60	55
Oregon	13.1	13.0	16.0	15.0	13.5	12.5	8.5	104	96	95	102	115	60	63
Western	10.4	10.2	12.7	11.5	8.6	8.4	6.4	75.9	76.8	76.1	75.3	79.4	38.8	40.9
United States	12.5	9.8	15.3	11.6	11.4	12.8	10.4	82.4	81.9	84.3	84.4	84.9	38.4	38.7

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

TABLE 37.—*Rye: Acreage, yield per acre, and production in specified countries, average 1921–22 to 1925–26, annual 1928–29 to 1931–32*

Country	Acreage					Yield per acre					Production				
	Average 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32 [1]	Average 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32 [1]	Average 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32 [1]
NORTHERN HEMISPHERE															
North America:	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Canada	1,386	840	992	1,448	778	14.4	17.4	13.3	15.2	6.8	19,994	14,618	13,160	22,018	5,322
United States	4,900	3,480	3,054	3,543	3,143	13.9	12.5	11.4	12.8	10.4	68,018	43,366	34,950	45,379	32,746
Total	6,286	4,320	4,046	4,991	3,921	14.0	13.4	11.9	13.5	9.7	88,012	57,984	48,110	67,397	38,068
Europe:															
Norway	28	18	18	19	15	27.9	27.6	29.9	29.3	35.9	780	497	538	556	538
Sweden	836	682	633	595	510	26.2	24.9	25.6	30.3	23.9	21,911	16,954	16,209	18,005	12,204
Denmark	535	361	380	369	332	24.6	26.8	27.4	27.2	26.1	13,162	9,683	10,411	10,025	8,661
Netherlands	501	485	488	475	444	31.4	35.7	37.5	31.4	29.6	15,731	17,333	18,300	14,892	13,125
Belgium	559	572	567	574	553	36.8	40.5	39.1	32.5	38.2	20,564	23,154	22,162	18,629	21,135
Luxemburg	19	15	18	22	16	18.4	23.5	23.1	21.8	19.1	349	352	416	480	306
France	2,196	1,900	1,837	1,878	1,775	18.5	17.9	19.8	15.6	17.5	40,645	34,079	36,463	29,255	31,013
Spain	1,802	1,535	1,519	1,551	1,516	15.4	10.7	15.1	13.9	12.2	27,721	16,398	22,935	21,543	18,512
Portugal	604	404	394	406	593	8.5	9.8	11.9	12.1		5,110	3,966	4,686	4,901	
Italy	317	311	308	302	288	19.2	21.0	22.4	20.3	21.5	6,100	6,535	6,909	6,127	6,195
Switzerland	55	56	56	50	46	31.8	35.0	33.2	29.7	31.1	1,747	1,962	1,862	1,484	1,429
Germany	10,745	11,452	11,680	11,641	10,788	23.8	29.3	27.5	26.0	24.4	255,937	335,499	321,045	302,312	262,977
Austria	878	938	925	927	904	18.3	21.2	21.7	22.3	20.3	16,086	19,920	20,097	20,635	18,322
Czechoslovakia	2,128	2,560	2,690	2,586	2,493	24.5	28.2	26.8	27.2	20.3	52,200	72,258	72,185	70,373	50,498
Hungary	1,591	1,608	1,623	1,611	1,484	16.9	20.3	19.4	17.6	14.5	26,839	32,587	31,423	28,406	21,575
Yugoslavia	477	496	587	610	623	12.6	15.2	14.1	12.8	12.2	6,001	7,527	8,268	7,825	7,614
Greece	84	137	128	163		12.5	12.6	10.5	11.4		1,051	1,731	1,345	1,866	1,815
Bulgaria	442	487	536	657	597	13.2	16.6	13.7	19.2	20.2	5,831	8,067	7,337	12,620	12,072
Rumania	692	731	773	968	1,006	12.1	15.7	17.2	18.9	15.7	8,371	11,483	13,266	18,288	15,747
Poland	12,911	13,197	14,328	14,567	14,262	16.0	18.2	19.3	18.8	15.6	206,884	240,545	275,959	273,923	222,822
Lithuania	1,355	1,161	1,113	1,196	1,257	16.9	16.2	19.8	21.1	12.8	22,942	18,752	22,030	25,177	16,121
Latvia	624	637	587	660	571	15.3	13.3	16.2	21.8	11.3	9,535	8,459	9,503	14,377	6,456
Estonia	[2] 394	357	329	367	356	[2] 15.9	15.5	17.4	24.2	15.9	[2] 6,246	5,537	5,736	8,884	5,657
Finland	578	550	504	502	554	19.6	20.0	20.7	28.1	21.3	11,316	10,999	10,443	14,104	11,792
Russia	59,672	64,460	68,581	72,233	70,086	11.4	11.6	11.9			679,304	749,979	818,497		
Total European countries reporting all years	39,663	40,109	41,499	42,127	40,390	19.6	22.4	22.5	21.8	18.9	776,898	898,580	933,497	917,920	764,771

Estimated European total, excluding Russia	40,400	40,600	42,100	42,700	41,200	------	------	------	------	------	784,000	905,000	940,000	926,000	773,000
Total Northern Hemisphere countries reporting all years	45,948	44,429	45,545	47,118	44,311	18.8	21.5	21.6	20.9	18.1	864,910	956,564	981,607	985,317	802,839
Estimated Northern Hemisphere total, excluding Russia and China	47,100	46,000	46,800	48,400	45,800	------	------	------	------	------	879,000	970,000	1,004,000	1,008,000	825,000
SOUTHERN HEMISPHERE															
Chile	4	9	8	8	7	16.0	16.2	16.2	15.0	------	64	146	130	120	------
Argentina	380	867	543	626	[3] 1,378	8.1	10.4	8.1	7.5	6.6	3,061	8,976	4,401	4,724	9,055
Union of South Africa	[4] 164	110	------	------	------	[4] 5.5	6.3	------	------	------	[4] 909	694	------	------	------
Australia	4	5	6	------	------	12.8	15.8	13.5	------	------	51	79	81	------	------
New Zealand	1	(5)	(5)	------	------	24.0	------	------	------	------	24	9	4	------	------
Estimated world total, excluding Russia and China	47,700	47,000	47,500	49,200	------	------	------	------	------	------	884,000	980,000	1,010,000	1,014,000	------

Bureau of Agricultural Economics. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930–31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

[1] Preliminary. [2] 4-year average. [3] Area sown. [4] 3-year average. [5] Less than 500 acre

TABLE 38.—*Rye: World production, 1894–95 to 1931–32*

Crop year	World production excluding Russia and China	Northern Hemisphere production excluding Russia and China	European production excluding Russia	Selected countries: Russia [1]	United States	Germany	France	Poland	Hungary	Czechoslovakia
	Million bushels	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*
1894–95	663	662	618	863	30	279	75	---------	58	---------
1895–96	620	618	573	773	31	260	72	---------	47	---------
1896–97	664	663	621	790	29	285	70	---------	51	---------
1897–98	599	598	551	654	33	273	48	---------	36	---------
1898–99	667	666	619	738	33	297	67	---------	46	---------
1899–1900	710	708	664	912	30	342	67	---------	50	---------
1900–1901	675	673	629	920	31	337	59	---------	42	---------
1901–2	690	688	644	755	31	321	58	---------	44	---------
1902–3	733	731	682	919	35	374	46	---------	53	---------
1903–4	768	767	721	912	32	391	58	---------	51	---------
1904–5	755	754	709	1,008	32	396	53	---------	46	---------
1905–6	782	781	732	737	35	378	59	---------	53	---------
1906–7	787	785	736	668	37	379	51	---------	54	---------
1907–8	751	749	700	815	35	384	56	---------	42	---------
1908–9	827	826	776	790	36	423	52	---------	48	---------
1909–10	872	870	821	904	35	447	56	---------	47	---------
1910–11	818	816	768	875	35	414	44	---------	52	---------
1911–12	828	826	779	769	33	428	47	---------	54	---------
1912–13	862	860	810	1,051	36	457	49	---------	57	---------
1913–14	892	889	834	1,011	41	481	50	---------	56	---------
1914–15	766	763	707	[2] 870	43	410	44	---------	45	---------
1915–16	691	689	621	[3] 910	54	360	33	---------	48	---------
1916–17	663	661	598	[4] 771	49	352	33	---------	---------	---------
1917–18	548	545	466	614	63	[5] 228	25	---------	---------	---------
1918–19	590	588	476	---------	91	260	29	---------	---------	---------
1919–20	681	679	581	---------	75	238	31	103	---------	---------
1920–21	619	616	533	368	60	194	37	74	[5] 20	33
1921–22	859	856	766	401	62	268	44	175	23	54
1922–23	869	864	721	568	103	206	38	203	25	51
1923–24	932	926	833	784	63	263	37	243	31	53
1924–25	745	741	655	737	66	226	40	148	22	45
1925–26	1,016	1,009	947	906	46	317	44	265	33	58
1926–27	830	823	763	941	41	252	30	204	31	56
1927–28	904	893	814	950	58	269	34	232	22	60
1928–29	980	970	905	750	43	335	34	241	33	72
1929–30 [6]	1,010	1,004	940	818	35	321	36	276	31	72
1930–31 [6]	1,014	1,008	926	---------	45	302	29	274	28	70
1931–32 [6]	---------	825	773	---------	33	263	31	223	22	50

Bureau of Agricultural Economics. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus, for 1930–31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

[1] Includes all Russian territory reporting for the years shown.
[2] Exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.
[3] Exclusive of Russian Poland, Lithuania, parts of Latvia and the Ukraine, and the two Provinces of Batum and Elizabetpol in Transcaucasia.
[4] Beginning with this year, estimates for the present territory of the Union of Socialist Soviet Republics exclusive of Turkestan, Transcaucasia, and the Far East, which territory in 1924 produced 8,646,000 bushels.
[5] Beginning with this year postwar boundaries, therefore not comparable with earlier years.
[6] Preliminary.

TABLE 39.—*Rye: Monthly marketings by farmers, as reported by about 3,500 mills and elevators, United States, 1921–22 to 1930–31*

Crop year	Percentage of year's receipts												
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Season
1921–22	13.9	20.8	17.6	10.6	6.3	5.9	4.5	4.8	4.9	4.0	4.2	2.5	100.0
1922–23	10.7	20.5	14.8	12.3	10.2	8.7	6.5	5.3	4.0	2.9	2.2	1.9	100.0
1923–24	5.3	18.8	19.2	14.2	9.4	8.5	5.4	5.9	3.5	2.5	3.0	4.3	100.0
1924–25	3.9	16.9	25.4	23.3	10.7	7.0	5.0	3.1	1.7	1.0	1.2	0.8	100.0
1925–26	5.2	19.2	23.3	12.4	8.7	8.9	6.6	4.6	3.1	2.4	2.8	2.8	100.0
1926–27	8.0	20.1	19.7	13.0	8.5	6.0	6.0	6.0	3.7	2.6	3.0	3.4	100.0
1927–28	4.7	19.0	25.6	17.5	9.8	5.8	4.4	4.1	3.7	2.4	1.7	1.3	100.0
1928–29	4.5	19.5	27.0	16.3	9.3	6.1	4.5	5.1	2.9	1.9	1.4	1.5	100.0
1929–30	12.3	34.0	18.0	11.6	6.6	6.0	3.4	2.3	1.7	1.4	1.5	1.2	100.0
1930–31	12.7	33.4	22.5	11.0	4.5	4.0	2.4	2.8	1.8	1.8	1.8	1.3	100.0

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TABLE 40.—*Rye: Receipts at specified markets, 1921–22 to 1930–31*

Year beginning July	Minneapolis	Duluth	Chicago	Milwaukee	Omaha	Total, 5 markets	Fort William and Port Arthur [1]
	1,000 bush.	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*
1921–22	4,754	17,444	4,235	2,282	2,048	30,763	5,297
1922–23	15,111	42,744	7,585	3,241	1,916	70,597	11,552
1923–24	13,336	16,836	2,952	1,449	736	35,309	6,837
1924–25	8,447	38,496	12,586	2,733	1,207	63,469	5,265
1925–26	7,872	10,907	2,426	876	892	22,973	5,329
1926–27	4,123	13,351	2,355	1,268	941	22,038	7,763
1927–28	5,423	25,088	4,151	673	1,564	36,899	11,963
1928–29	7,375	10,881	5,288	1,053	1,354	25,951	8,180
1929–30	7,057	7,039	7,628	736	1,755	24,215	5,391
1930–31 [2]	9,484	3,140	3,512	242	778	17,156	7,024

Bureau of Agricultural Economics. Compiled from reports of Minneapolis Chamber of Commerce, Duluth Board of Trade, Chicago Board of Trade, Milwaukee Chamber of Commerce, Omaha Grain Exchange, Grain and Feed Journal, and Canadian Grain Statistics.

[1] Crop year begins September. [2] Preliminary.

TABLE 41.—*Rye: Classification of receipts graded by licensed inspectors, all inspection points, 1923–24 to 1930–31*

Year beginning July	Grade					
	No. 1	No. 2	No. 3	No. 4	Sample	Total
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
1923–24	14,394	13,532	3,872	1,061	473	33,332
1924–25	27,977	24,251	8,841	2,957	876	64,902
1925–26	3,969	11,730	5,111	1,794	494	23,098
1926–27	3,892	9,921	5,794	3,597	1,445	24,649
1927–28	10,659	15,573	4,976	1,409	564	33,181
1928–29	1,787	13,081	6,646	1,994	626	24,134
1929–30	8,985	10,611	1,642	475	288	22,001
1930–31	5,804	9,320	1,198	225	103	16,650

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TABLE 42.—*Rye: Commercial stocks in store, 1926–27 to 1930–31*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
DOMESTIC RYE IN UNITED STATES [1]												
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1926–27	-------	-------	-------	-------	-------	-------	13,092	12,880	13,897	13,905	7,818	3,783
1927–28	1,018	1,454	2,091	2,608	2,077	2,970	3,281	4,027	4,321	5,090	5,544	2,662
1928–29	2,499	2,170	1,351	2,684	4,771	5,589	6,176	6,185	6,440	6,914	6,598	6,532
1929–30	6,632	6,614	8,561	9,771	11,453	12,033	12,914	14,536	14,379	14,285	13,701	12,572
1930–31	12,481	12,073	14,248	17,010	17,291	17,173	16,361	15,629	14,270	13,199	10,990	10,599
1931–32	9,989	9,838	9,405	10,095	10,376	10,431	-------	-------	-------	-------	-------	-------
UNITED STATES RYE IN CANADA												
1926–27	-------	-------	-------	-------	-------	-------	1,658	1,704	1,583	1,384	3,379	869
1927–28	1,465	589	686	1,385	1,390	1,208	930	772	351	259	47	512
1928–29	750	449	357	838	1,248	1,478	1,707	1,426	1,255	1,310	1,367	1,379
1929–30	1,182	1,255	1,540	2,900	2,883	2,113	2,734	2,720	2,519	2,692	2,871	3,821
1930–31	3,789	3,761	3,432	3,139	2,792	2,900	2,131	2,128	2,126	2,119	2,110	1,911
1931–32	1,682	1,792	1,775	1,229	821	782	-------	-------	-------	-------	-------	-------
CANADIAN RYE IN UNITED STATES [2]												
1926–27	-------	-------	-------	-------	-------	-------	2,266	1,922	1,631	494	689	792
1927–28	63	50	20	124	441	802	851	458	203	90	90	371
1928–29	248	255	12	83	205	258	208	532	559	440	451	480
1929–30	380	394	432	320	429	431	431	431	371	370	426	270
1930–31	188	187	172	172	430	651	489	446	528	349	273	2
1931–32	2	2	2	390	388	1,405	-------	-------	-------	-------	-------	-------

Bureau of Agricultural Economics. Compiled from weekly reports to the grain, hay, and feed market news service. Data are for stocks on the Saturday nearest the 1st day of the month.

[1] Includes rye in store in public and private elevators in 42 important markets and also the rye afloat in vessels or barges in harbors of lake and seaboard ports. Rye in transit either by rail or water, mill stocks or small private stocks of rye intended only for local purposes, not included.

[2] Includes rye stored at lake and seaboard ports, exclusive of rye in transit on lakes and canals.

TABLE 43.—*Rye: Estimated average price per bushel received by producers, United States, 1922–23 to 1931–32*

Crop year	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	74.0	66.9	63.2	65.2	68.2	70.7	71.7	71.0	70.1	70.8	69.2	62.2	68.1
1923–24	56.3	55.3	57.2	58.8	62.1	63.9	63.5	64.5	62.8	60.4	60.1	61.6	59.4
1924–25	68.8	79.8	80.1	105.7	108.6	112.7	126.2	132.2	125.1	100.9	103.6	101.8	96.3
1925–26	92.3	92.8	81.9	74.1	73.4	86.8	88.2	82.5	73.4	73.8	72.5	76.0	83.1
1926–27	80.7	86.1	81.6	82.4	83.0	82.4	83.6	88.4	86.4	85.2	90.1	94.9	84.2
1927–28	91.2	80.6	81.4	81.0	84.0	87.8	88.0	89.5	96.0	99.8	111.5	106.8	84.7
1928–29	99.2	83.6	81.8	87.1	86.3	87.2	87.9	91.5	91.5	86.0	79.1	75.7	85.4
1929–30	85.3	91.8	89.2	89.9	85.5	88.4	85.7	78.3	68.4	68.7	63.8	60.7	87.7
1930–31	43.6	53.0	53.1	47.6	41.6	41.1	37.4	34.9	34.3	32.8	33.0	31.4	48.0
1931–32	33.0	32.5	33.2	33.6	41.4	36.8	------	------	------	------	------	------	--------

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on 1st of month and 1st of succeeding month, July, 1922–December, 1923.

TABLE 44.—*Rye, including flour in terms of grain: International trade, average 1925–26 to 1929–30, annual 1927–28 to 1930–31*

Country	Year beginning July: Average 1925–26 to 1929–30		1927–28		1928–29		1929–30		1930–31 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Germany	15,498	13,815	10,199	24,861	22,965	7,234	20,484	5,035	4,518	1,233
United States	14,556	0	26,346	0	9,488	0	2,600	0	195	0
Russia	[2] 7,482	0	5,901	0	237	0	--------	0	--------	0
Poland	6,597	2,453	375	4,831	1,415	792	14,150	34	15,743	10
Hungary	6,559	1	4,432	1	5,136	1	5,942	0	3,321	0
Canada	6,328	129	10,379	114	6,430	166	835	298	1,968	18
Argentina	4,511	0	7,060	0	5,862	0	1,916	0	1,610	0
Rumania	1,133	12	2,187	0	[3] 914	[3] 8	[3] 661	[3] 0	[3] 2,162	[3] 0
Bulgaria	486	0	807	0	1,046	0	14	0	2,444	0
Yugoslavia [4]	176	6	13	18	54	9	60	1	--------	--------
Algeria [4]	[2] 46	[2] 2	40	0	62	6	--------	--------	--------	--------
Total	63,372	16,418	67,739	29,825	53,609	8,216	46,662	5,368	31,961	1,261
PRINCIPAL IMPORTING COUNTRIES										
Denmark	414	8,109	417	7,401	392	7,216	394	10,767	423	13,471
Norway	--------	7,027	--------	7,307	--------	6,024	--------	7,047	--------	5,216
Finland	10	6,193	10	4,932	12	7,757	9	6,509	5	3,136
Czechoslovakia	963	4,701	102	7,622	1,664	2,581	2,815	502	980	717
Austria	103	4,645	101	4,617	64	5,054	69	5,258	86	4,592
Netherlands	528	4,525	629	4,147	531	3,451	207	4,943	1,454	11,348
Latvia [4]	25	3,203	9	1,960	16	5,386	12	3,914	0	465
Sweden	537	3,008	636	4,177	260	4,550	49	4,225	20	1,131
Estonia	--------	2,244	--------	1,085	--------	2,680	--------	3,591	--------	515
Belgium	43	1,625	67	753	33	376	15	1,598	240	6,294
France	31	1,535	8	753	5	573	12	441	19	4,284
United Kingdom [5]	98	696	83	717	42	489	25	315	13	346
Italy	9	386	17	107	1	219	1	575	1	1,324
Switzerland	0	91	--------	53	--------	6	--------	296	0	296
Total	2,761	47,988	2,079	45,631	3,020	46,362	3,608	49,981	3,241	53,135

Bureau of Agricultural Economics. Official sources except where otherwise noted.

[1] Preliminary.
[2] 4-year average.
[3] Monthly Crop Report and Agricultural Statistics.
[4] Year beginning August 1; International Yearbook of Agricultural Statistics.
[5] Calendar year.

TABLE 45.—*Rye No. 2: Weighted average price [1] per bushel of reported cash sales, Minneapolis, 1922–23 to 1931–32*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	76	69	66	71	81	83	82	80	76	81	72	64	75
1923–24	61	62	66	66	64	65	67	66	63	61	63	70	65
1924–25	83	86	95	121	123	133	154	154	130	106	114	111	114
1925–26	95	100	83	77	81	98	99	91	81	85	83	89	88
1926–27	102	97	93	95	94	94	99	102	99	99	109	111	98
1927–28	104	92	92	92	99	102	103	106	114	124	128	123	104
1928–29	111	94	94	94	98	97	101	105	100	89	85	84	95
1929–30	107	98	97	97	95	98	91	78	66	68	65	57	90
1930–31	55	60	55	49	43	44	38	37	36	35	36	37	51
1931–32	37	38	39	41	51	45	------	------	------	------	------	------	---------

Bureau of Agricultural Economics. Compiled from Minneapolis Daily Market Record. Chicago prices, 1909–1927 appear in 1927 Yearbook, Table 46. Minneapolis prices, 1909–1921, appear in 1930 Yearbook, Table 43.

[1] Average of daily prices weighted by car-lot sales.

TABLE 46.—*Corn: Acreage, production, value, exports, etc., United States, 1890–1931*

Year	Acreage	Average yield per acre	Production	Production as grain	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Price per bushel at Chicago [1]	Foreign trade, including meal, year beginning July [2]			
								Domestic exports	Imports	Net exports [3]	
										Total	Percentage of production
	1,000 acres	*Bushels of 56 lbs. shelled*	*1,000 bushels*	*1,000 bushels*	*Cents*	*1,000 dollars*	*Cents*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*Per cent*
1890	70,390	20.7	1,460,406		50.0	729,647	58	32,042	2	32,039	2.2
1891	74,496	27.6	2,055,823		39.7	816,917	47	76,602	16	76,596	3.7
1892	72,610	23.6	1,713,688		38.8	644,390	41	47,122	2	47,120	2.7
1893	74,434	22.9	1,707,572		35.9	612,998	41	66,490	3	66,487	3.9
1894	69,396	19.3	1,339,680		45.1	604,523	44	28,585	17	28,569	2.1
1895	85,567	27.0	2,310,952		25.0	578,408	26	101,100	5	101,096	4.4
1896	86,560	28.9	2,503,484		21.3	532,884	25	178,817	7	178,811	7.1
1897	88,127	24.3	2,144,553		26.0	558,309	30	212,056	4	212,052	9.9
1898	88,304	25.6	2,261,119		28.4	642,747	34	177,255	4	177,252	7.8
1899	*94,914*	*28.1*	*2,666,324*								
1899	94,914	25.9	2,454,628		29.9	734,916	36	213,123	3	213,121	8.7
1900	95,042	26.4	2,505,148		35.1	878,243	43	181,405	5	181,400	7.2
1901	94,636	17.0	1,613,528		60.1	969,285	62	28,029	19	28,011	1.7
1902	95,517	27.4	2,619,499		40.1	1,049,791	47	76,639	41	76,598	2.9
1903	90,661	25.9	2,346,897		42.1	987,882	49	58,222	17	58,210	2.5
1904	93,340	27.1	2,528,662		43.7	1,105,690	48	90,293	16	90,278	3.6
1905	93,573	29.4	2,748,949		40.8	1,120,513	44	119,894	11	119,883	4.4
1906	93,643	30.9	2,897,662		39.3	1,138,053	50	86,368	11	86,358	3.0
1907	94,971	26.5	2,512,065		50.9	1,277,607	68	55,064	20	55,044	2.2
1908	95,603	26.6	2,544,957		60.0	1,527,679	65	37,665	258	37,437	1.5
1909	*98,383*	*25.9*	*2,552,190*								
1909	98,383	26.1	2,572,336		58.6	1,507,185	59	38,128	118	38,010	1.5
1910	104,035	27.7	2,886,260		48.0	1,384,817	53	65,615	53	65,562	2.3
1911	105,825	23.9	2,531,488		61.8	1,565,258	71	41,797	54	41,744	1.6
1912	107,083	29.2	3,124,746		48.7	1,520,454	53	50,780	903	49,913	1.6
1913	105,820	23.1	2,446,988		69.1	1,692,092	70	10,726	12,368	[4] 1,639	
1914	103,435	25.8	2,672,804		64.4	1,722,070	70	50,668	9,899	40,816	1.5
1915	106,197	28.2	2,994,793		57.5	1,722,680	79	39,897	5,211	34,761	1.2
1916	105,296	24.4	2,566,927		88.9	2,280,729	111	66,753	2,270	65,092	2.5
1917	116,730	26.3	3,065,233		127.9	3,920,228	163	49,073	3,197	45,950	1.5
1918	104,467	24.0	2,502,665		136.5	3,416,240	162	23,019	3,346	19,684	.8
1919 [5]	*87,772*	*26.7*		*2,345,833*							
1919	97,170	28.9	2,811,302		134.5	3,780,597	159	16,729	10,283	6,509	.2
1920	101,699	31.5	3,208,584		67.0	2,150,332	62	70,906	5,791	66,116	2.1
1921	103,740	29.6	3,068,569		42.3	1,297,213	55	179,490	142	179,374	5.8
1922	102,846	28.3	2,906,020		65.8	1,910,775	73	96,596	182	96,415	3.3
1923	104,324	29.3	3,053,557	2,600,891	72.6	2,217,229	88	23,135	240	22,896,	.7
1924 [5]	*82,329*	*22.2*		*1,823,880*							
1924	100,863	22.9	2,309,414	1,900,204	98.2	2,266,771	106	9,791	4,618	5,348	.2
1925	101,302	28.8	2,916,106	2,445,632	67.4	1,966,162	75	24,783	637	24,150	.8
1926	99,615	27.0	2,691,531	2,233,173	64.2	1,728,970	87	19,819	1,098	18,731	.7
1927	98,393	28.1	2,763,093	2,300,845	72.3	1,997,759	101	19,409	5,463	14,364	.5
1928	100,673	28.0	2,818,901	2,364,069	75.2	2,119,046	92	41,874	490	41,387	1.5
1929	97,806	25.9	2,535,386	2,140,177	77.4	1,962,832	83	10,281	497	9,788	.4
1930	100,743	20.4	2,060,185	1,717,383	65.5	1,349,218	60	3,317	1,747	1,572	.1
1931 [6]	104,970	24.4	2,556,863	2,194,574	36.0	920,142					

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board and relate to equivalent production of grain on entire acreage grown for all purposes; italic figures are census returns. See 1927 Yearbook, p. 774, for data for earlier years.

[1] Prices 1890–1898 are averages of the weekly quotations for No. 2 or better in annual reports of Chicago Board of Trade; subsequent prices are compiled from the Chicago Daily Trade Bulletin, average of daily prices weighted by car-lots sales, No. 3 yellow.

[2] Compiled from Commerce and Navigation of the United States, 1890–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1926; January and June issues, 1927–1931 and official records of the Bureau of Foreign and Domestic Commerce. Corn—General imports 1890–1909 and 1912–1931; imports for consumption 1910–11. Corn meal—Imports for consumption, 1890–1931. Corn meal converted to terms of grain on the basis of 4 bushels of corn to a barrel of meal.

[3] Total exports (domestic plus foreign) minus total imports.

[4] Net imports, i. e., total imports minus total exports (domestic and foreign).

[5] Corn harvested for grain; total acreage of corn in 1924 is 98,401,627 acres.

[6] Preliminary.

TABLE 47.—*Corn: Acreage and production, by States, average 1924–1928, annual 1928–1931*

State and division	Acreage					Production				
	Average, 1924–1928	1928	1929	1930	1931 [1]	Average, 1924–1928	1928	1929	1930	1931 [1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*
Maine	13	13	13	13	14	510	520	520	546	588
New Hampshire	14	14	13	13	13	638	560	533	585	598
Vermont	83	80	62	60	64	3, 668	3, 520	2, 542	2, 580	2, 944
Massachusetts	44	45	40	39	37	1, 950	1, 890	1, 560	1, 755	1, 591
Rhode Island	9	10	9	9	8	373	390	372	378	344
Connecticut	54	55	50	51	51	2, 321	2, 310	2, 150	2, 142	2, 142
New York	670	650	566	555	566	23, 197	22, 100	17, 603	16, 650	22, 074
New Jersey	188	181	170	168	170	7, 951	6, 968	6, 290	6, 048	6, 970
Pennsylvania	1, 334	1, 283	1, 231	1, 219	1, 268	55, 440	50, 037	45, 547	26, 818	62, 766
North Atlantic	2, 410	2, 331	2, 154	2, 127	2, 191	96, 048	88, 295	77, 117	57, 502	100, 017
Ohio	3, 557	3, 646	3, 473	3, 438	3, 576	132, 495	136, 725	119, 818	87, 669	160, 920
Indiana	4, 496	4, 483	4, 253	4, 466	4, 555	156, 990	157, 802	131, 843	117, 009	168, 535
Illinois	9, 117	9, 570	8, 575	8, 832	9, 185	326, 691	367, 488	304, 412	229, 632	339, 845
Michigan	1, 545	1, 461	1, 197	1, 245	1, 407	50, 733	48, 944	29, 925	26, 768	40, 944
Wisconsin	2, 142	2, 121	1, 942	1, 981	2, 080	77, 770	89, 082	67, 970	67, 354	58, 240
Minnesota	4, 267	4, 089	4, 359	4, 533	4, 896	137, 379	139, 026	156, 924	140, 523	115, 056
Iowa	11, 084	11, 202	11, 048	11, 335	11, 640	417, 137	464, 883	444, 130	385, 390	389, 940
Missouri	6, 314	6, 260	5, 566	6, 123	6, 184	175, 139	181, 540	130, 801	85, 722	170, 060
North Dakota	1, 068	997	1, 005	1, 035	1, 159	23, 952	24, 426	15, 075	18, 112	21, 442
South Dakota	4, 609	4, 469	5, 095	5, 146	4, 837	98, 617	93, 849	120, 752	82, 336	25, 152
Nebraska	8, 910	8, 937	9, 516	9, 564	10, 138	214, 381	212, 701	242, 658	239, 100	172, 346
Kansas	6, 148	6, 634	6, 643	6, 776	6, 505	131, 564	179, 118	116, 252	81, 312	113, 838
North Central	63, 257	63, 869	62, 672	64, 474	66, 162	1, 942, 848	2, 095, 584	1, 880, 560	1, 560, 927	1, 776, 318
Delaware	136	136	134	138	146	4, 446	4, 488	3, 618	2, 622	4, 745
Maryland	536	530	499	508	545	21, 064	19, 345	15, 718	6, 858	20, 710
Virginia	1, 625	1, 626	1, 454	1, 498	1, 527	41, 546	44, 715	35, 187	16, 478	43, 061
West Virginia	473	459	434	421	446	15, 649	16, 524	12, 326	5, 052	12, 934
North Carolina	2, 350	2, 305	1, 985	2, 233	2, 345	46, 929	42, 642	37, 715	40, 194	48, 072
South Carolina	1, 516	1, 422	1, 392	1, 531	1, 608	20, 780	17, 064	20, 184	22, 200	22, 994
Georgia	3, 840	3, 620	3, 432	3, 432	3, 672	47, 049	38, 010	41, 184	36, 036	36, 720
Florida	582	607	648	648	674	7, 971	7, 891	6, 804	5, 832	5, 729
South Atlantic	11, 059	10, 705	9, 978	10, 409	10, 963	205, 434	190, 679	172, 736	135, 272	194, 965
Kentucky	3, 052	3, 029	2, 843	2, 815	2, 871	80, 949	66, 638	66, 810	28, 150	80, 388
Tennessee	3, 044	2, 915	2, 816	2, 788	2, 872	68, 522	56, 842	63, 923	39, 032	71, 800
Alabama	2, 794	2, 650	2, 634	2, 819	3, 101	39, 010	30, 475	36, 876	29, 600	43, 414
Mississippi	1, 964	1, 765	1, 999	1, 999	2, 299	31, 628	24, 710	35, 382	22, 988	42, 532
Arkansas	2, 010	2, 002	1, 866	1, 776	1, 954	34, 733	34, 034	28, 923	8, 347	43, 965
Louisiana	1, 201	1, 242	1, 190	1, 119	1, 287	19, 516	21, 114	18, 802	12, 309	20, 592
Oklahoma	2, 800	3, 050	3, 070	3, 193	3, 321	57, 816	70, 150	46, 050	35, 762	51, 808
Texas	4, 131	4, 722	4, 251	4, 634	5, 236	82, 719	99, 162	70, 142	74, 144	94, 248
South Central	20, 996	21, 375	20, 669	21, 143	22, 941	414, 894	403, 125	366, 908	250, 332	448, 747
Montana	351	274	134	141	123	6, 093	5, 206	1, 608	1, 692	1, 722
Idaho	68	53	32	35	42	2, 697	2, 438	1, 120	1, 330	1, 428
Wyoming	178	167	160	192	186	3, 253	2, 672	2, 080	3, 552	1, 953
Colorado	1, 396	1, 438	1, 533	1, 732	1, 836	16, 806	18, 694	22, 228	38, 970	19, 278
New Mexico	196	199	250	257	283	3, 500	3, 482	4, 425	3, 598	5, 660
Arizona	39	39	29	31	36	1, 048	1, 014	435	496	576
Utah	18	18	15	16	16	440	522	465	496	320
Nevada	2	2	2	2	2	47	44	56	46	40
Washington	48	46	33	34	37	1, 684	1, 794	1, 172	1, 292	1, 369
Oregon	74	82	63	60	62	2, 440	2, 952	2, 016	1, 980	1, 860
California	78	75	82	90	90	2, 576	2, 400	2, 460	2, 700	2, 610
Western	2, 447	2, 393	2, 333	2, 590	2, 713	40, 585	41, 218	38, 065	56, 152	36, 816
United States	100, 169	100, 673	97, 806	100, 743	104, 970	2, 699, 809	2, 818, 901	2, 535, 386	2, 060, 185	2, 556, 863

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.

TABLE 48.—*Corn: Yield per acre, average 1919–1928, and annual 1926–1931, and estimated price per bushel December 1, average 1925–1929, and annual 1926–1931, by States*

State and division	Yield per acre							Estimated price per bushel Dec. 1						
	Average, 1919–1928	1926	1927	1928	1929	1930	1931	Average, 1925–1929	1926	1927	1928	1929	1930	1931
	Bus.	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Maine	42.9	35.0	37.0	40.0	40.0	42.0	42.0	111	100	110	115	120	100	70
New Hampshire	45.2	43.0	41.0	40.0	41.0	45.0	46.0	107	100	105	120	110	105	68
Vermont	45.0	43.0	39.0	44.0	41.0	43.0	46.0	103	95	105	110	105	100	63
Massachusetts	44.5	44.0	41.0	42.0	39.0	45.0	43.0	122	115	120	130	135	100	60
Rhode Island	41.2	41.0	38.0	39.0	41.3	42.0	43.0	126	115	120	135	140	110	60
Connecticut	44.3	42.0	38.0	42.0	43.0	42.0	42.0	117	115	120	130	110	105	70
New York	37.0	35.0	34.0	34.0	31.1	30.0	39.0	96	86	96	99	103	90	60
New Jersey	42.4	46.0	40.0	38.5	37.0	36.0	41.0	87	80	85	97	101	95	52
Pennsylvania	43.1	41.0	39.5	39.0	37.0	22.0	49.5	88	78	91	93	100	95	46
North Atlantic	41.5	39.9	37.9	37.9	35.8	27.0	45.6	92.4	82.7	93.9	97.7	102.3	94.5	51.1
Ohio	39.2	41.0	32.5	37.5	34.5	25.5	45.0	70	60	77	76	78	67	34
Indiana	36.3	38.0	31.5	35.2	31.0	26.2	37.0	63	50	68	69	74	61	28
Illinois	35.6	35.0	30.0	38.4	35.5	26.0	37.0	65	56	71	70	72	62	30
Michigan	34.8	34.0	27.5	33.5	25.0	21.5	29.1	81	73	85	84	89	77	40
Wisconsin	39.7	34.5	32.5	42.0	35.0	34.0	28.0	78	75	84	78	83	72	47
Minnesota	34.9	34.0	30.5	34.0	36.0	31.0	23.5	61	56	64	62	65	53	37
Iowa	40.3	39.0	35.5	41.5	40.2	34.0	33.5	64	56	69	67	70	58	35
Missouri	28.6	27.2	29.0	29.0	23.5	14.0	27.5	74	68	75	73	86	75	33
North Dakota	25.8	18.0	25.0	24.5	15.0	17.5	18.5	63	68	62	61	68	53	37
South Dakota	26.0	18.0	29.0	21.0	23.7	16.0	5.2	60	58	57	62	62	47	41
Nebraska	26.6	15.5	33.1	23.8	25.5	25.0	17.0	66	68	62	71	69	51	38
Kansas	21.1	11.0	30.0	27.0	17.5	12.0	17.5	67	70	61	65	74	59	31
North Central	32.8	29.0	31.5	32.8	30.0	24.2	26.8	65.5	59.7	68.0	69.3	72.2	59.1	33.9
Delaware	33.0	31.0	35.0	33.0	27.0	19.0	32.5	77	64	80	88	88	91	40
Maryland	39.4	39.8	44.0	36.5	31.5	13.5	38.0	78	64	80	88	88	93	40
Virginia	26.8	27.5	29.5	27.5	24.2	11.0	28.2	96	85	92	100	100	105	46
West Virginia	33.5	33.0	33.5	36.0	28.4	12.0	29.0	101	94	100	103	106	109	52
North Carolina	20.3	22.0	22.8	18.5	19.0	18.0	20.5	98	88	91	103	100	93	43
South Carolina	15.1	15.5	17.0	12.0	14.5	14.5	14.3	99	90	90	106	99	90	44
Georgia	13.0	14.5	14.0	10.5	12.0	10.5	10.0	90	76	81	105	88	86	46
Florida	13.8	14.0	13.0	13.0	10.5	9.0	8.5	95	92	97	100	85	90	53
South Atlantic	19.3	20.5	21.0	17.8	17.3	13.0	17.8	93.2	82.4	88.2	101.0	95.5	92.5	44.8
Kentucky	26.9	33.0	26.0	22.0	23.5	10.0	28.0	84	65	88	96	91	92	36
Tennessee	23.5	27.5	24.0	19.5	22.7	14.0	25.0	86	66	83	100	92	93	38
Alabama	14.2	16.2	16.0	11.5	14.0	10.5	14.0	95	76	92	110	98	96	41
Mississippi	16.2	19.2	17.8	14.0	17.7	11.5	18.5	93	82	93	102	93	98	40
Arkansas	18.5	20.5	19.0	17.0	15.5	4.7	22.5	91	80	87	91	98	96	37
Louisiana	17.0	17.5	17.5	17.0	15.8	11.0	16.0	92	90	90	94	90	93	47
Oklahoma	20.8	26.0	26.5	23.0	15.0	11.2	15.6	70	56	59	68	79	65	30
Texas	21.6	27.8	23.0	21.0	16.5	16.0	18.0	80	60	65	78	85	73	32
South Central	20.4	24.6	22.0	18.9	17.8	11.8	19.6	82.8	67.5	77.3	88.2	89.9	83.9	36.3
Montana	17.4	11.0	23.5	19.0	12.0	12.0	14.0	85	92	72	82	84	66	57
Idaho	38.3	41.0	41.0	46.0	35.0	38.0	34.0	87	90	82	92	94	70	53
Wyoming	20.4	20.0	20.0	16.0	13.0	18.5	10.5	75	72	74	75	85	67	45
Colorado	15.2	7.0	15.5	13.0	14.5	22.5	10.5	70	71	68	68	75	62	40
New Mexico	18.4	20.0	15.0	17.5	17.7	14.0	20.0	92	87	93	89	89	77	43
Arizona	27.4	28.0	32.0	26.0	15.0	16.0	16.0	124	120	115	125	130	115	86
Utah	23.9	24.0	27.0	29.0	31.0	31.0	20.0	107	115	110	110	100	100	69
Nevada	25.1	24.0	25.0	22.0	28.0	23.0	20.0	117	120	115	112	120	115	70
Washington	36.6	35.0	37.0	39.0	35.5	38.0	37.0	96	95	90	99	103	88	50
Oregon	32.0	33.0	36.0	36.0	32.0	33.0	30.0	100	100	95	100	98	83	65
California	33.5	31.5	32.0	32.0	30.0	30.0	29.0	110	106	108	105	112	87	67
Western	19.0	13.1	19.9	17.2	16.3	21.7	13.6	82.6	85.8	78.1	81.2	83.6	67.0	46.6
United States	28.2	27.0	28.1	28.0	25.9	20.4	24.4	71.3	64.2	72.3	75.2	77.4	65.5	36.0

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

TABLE 49.—*Corn: Utilization for grain, silage, hogging down, grazing, and forage, by States, 1930 and 1931*

State and division	1930					1931 [1]				
	For grain		For silage		Hogging down, grazing and forage acreage	For grain		For silage		Hogging down, grazing, and forage acreage
	Acreage	Production	Acreage	Production		Acreage	Production	Acreage	Production	
	1,000 acres	*1,000 bushels*	*1,000 acres*	*1,000 short tons*	*1,000 acres*	*1,000 acres*	*1,000 bushels*	*1,000 acres*	*1,000 short tons*	*1,000 acres*
Maine	2	84	8	86	3	2	84	9	92	3
New Hampshire	3	135	8	84	2	3	135	8	88	2
Vermont	6	258	44	440	10	7	322	48	542	9
Massachusetts	10	450	23	253	6	9	387	21	235	7
Rhode Island	2	84	5	50	2	1	43	5	55	2
Connecticut	12	504	33	363	6	12	504	33	346	6
New York	111	3,330	339	2,814	105	111	4,329	346	3,806	109
New Jersey	130	4,810	30	255	8	134	5,628	29	284	7
Pennsylvania	829	18,238	317	1,902	73	913	45,194	317	3,328	38
North Atlantic	1,105	27,893	807	6,247	215	1,192	56,626	816	8,776	183
Ohio	2,853	76,460	234	1,264	351	3,081	140,186	152	1,444	343
Indiana	3,855	106,784	171	992	440	4,200	155,400	110	869	245
Illinois	7,860	204,360	371	2,412	601	8,404	310,948	230	1,725	551
Michigan	600	14,400	330	1,551	315	827	25,637	297	2,079	283
Wisconsin	731	25,950	1,023	7,161	227	754	21,866	1,095	7,336	231
Minnesota	3,006	96,192	484	3,436	1,043	3,116	74,784	528	3,432	1,252
Iowa	9,822	333,948	285	2,280	1,228	9,961	333,694	328	2,460	1,351
Missouri	5,170	72,380	92	414	861	5,599	153,972	55	344	530
North Dakota	138	2,553	68	238	829	168	3,276	71	241	920
South Dakota	3,522	59,874	64	230	1,560	2,395	19,639	102	245	2,340
Nebraska	8,764	219,100	72	396	728	9,156	155,652	108	454	874
Kansas	5,473	68,412	331	1,258	972	5,511	99,198	265	1,192	729
North Central	51,794	1,280,413	3,525	21,632	9,155	53,172	1,494,252	3,341	21,821	9,649
Delaware	134	2,546	3	20	1	142	4,615	3	26	1
Maryland	463	6,250	34	170	11	510	19,380	25	250	10
Virginia	1,213	13,343	124	434	161	1,427	40,241	55	550	45
West Virginia	367	4,404	31	155	23	421	12,209	16	152	9
North Carolina	2,135	38,430	13	72	85	2,244	46,002	12	64	89
South Carolina	1,493	21,648	3	16	35	1,572	22,480	3	18	33
Georgia	3,321	34,870	7	32	104	3,540	35,400	7	38	125
Florida	616	5,544	2	12	30	645	5,482	2	11	27
South Atlantic	9,742	127,035	217	911	450	10,501	185,809	123	1,109	339
Kentucky	2,554	25,540	30	105	231	2,678	74,984	20	140	173
Tennessee	2,642	36,988	18	63	128	2,758	68,950	18	108	96
Alabama	2,720	28,560	5	20	94	3,060	42,840	5	25	36
Mississippi	1,970	23,640	2	7	27	2,259	41,792	2	12	38
Arkansas	1,614	7,747	2	6	160	1,808	40,680	2	12	144
Louisiana	1,090	11,990	2	10	27	1,261	20,176	2	6	24
Oklahoma	2,963	33,778	12	41	218	3,153	50,448	12	54	156
Texas	4,440	71,040	8	30	186	5,099	91,782	8	30	129
South Central	19,993	239,283	79	282	1,071	22,076	431,652	69	387	796
Montana	16	192	2	10	123	10	175	2	10	111
Idaho	21	819	5	45	9	26	910	6	45	10
Wyoming	80	1,560	2	16	110	72	900	2	8	112
Colorado	1,461	33,603	46	253	225	1,461	16,071	50	200	325
New Mexico	221	3,094	3	15	33	243	4,860	4	24	36
Arizona	22	352	3	21	6	25	400	4	28	7
Utah	7	224	3	33	6	7	154	3	24	6
Nevada	1	25	1	8	0	1	24	1	7	0
Washington	11	418	9	86	14	11	407	10	100	16
Oregon	24	840	21	143	15	25	750	22	143	15
California	48	1,632	21	197	21	48	1,584	21	178	21
Western	1,912	42,759	116	827	562	1,929	26,235	125	767	659
United States	84,546	1,717,383	4,744	29,899	11,453	88,870	2,194,574	4,474	32,860	11,626

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.

TABLE 50.—*Corn: Acreage, yield per acre, and production in specified countries, average 1921–22 to 1925–26, annual 1928–29 to 1931–32*

Country	Acreage					Yield per acre					Production				
	Average, 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32 [1]	Average, 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32 [1]	Average, 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32 [1]
NORTHERN HEMISPHERE	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
North America:															
Canada	293	139	152	161	131	44.3	37.7	34.1	36.2	41.4	12,974	5,241	5,183	5,826	5,426
United States	102,615	100,673	97,806	100,743	104,970	27.8	28.0	25.9	20.4	24.4	2,850,733	2,818,901	2,535,386	2,060,185	2,556,863
Mexico	7,575	7,690	7,080	7,598	7,939	11.3	11.1	8.2	7.1	9.6	85,241	85,540	57,824	54,200	75,961
Guatemala	390	298	347	418	-------	19.9	14.1	14.4	14.7	-------	7,772	4,195	5,006	6,137	-------
Total North American countries reporting area and production, all years	110,483	108,502	105,038	108,502	113,040	26.7	26.8	24.7	19.5	23.3	2,948,948	2,909,682	2,598,393	2,120,211	2,638,250
Estimated North American total	111,800	109,600	106,200	109,700	114,200	-------	-------	-------	-------	-------	2,968,000	2,925,000	2,613,000	2,136,000	2,654,000
Europe:															
France	830	849	839	832	833	17.8	14.3	22.2	26.5	28.4	14,754	12,115	18,657	22,023	23,654
Spain	1,167	959	1,006	1,106	1,052	22.2	22.3	24.6	26.1	25.1	25,933	21,374	24,793	28,843	26,403
Portugal	762	866	904	900	865	15.5	16.5	16.5	18.6	-------	11,795	14,309	14,924	16,722	-------
Italy	3,792	3,710	3,719	3,745	3,661	25.0	17.5	26.8	31.5	21.4	94,793	64,990	99,622	118,016	78,197
Austria	140	143	138	143	148	25.4	29.7	33.5	33.3	40.0	3,553	4,248	4,617	4,756	5,917
Czechoslovakia	390	355	333	364	368	26.8	24.7	27.4	26.9	23.8	10,444	8,763	9,113	9,783	8,748
Hungary	2,425	2,623	2,774	2,605	2,735	24.1	18.9	25.5	21.3	21.1	58,353	49,592	70,631	55,395	57,605
Yugoslavia	4,759	5,018	5,883	6,096	6,158	23.0	14.3	27.8	22.4	20.6	109,399	71,612	163,285	136,393	126,687
Bulgaria	1,458	1,601	1,977	1,689	1,676	14.4	12.7	18.7	18.1	23.4	21,021	20,272	37,005	30,514	39,256
Rumania	8,799	11,010	11,848	10,938	11,749	16.0	9.9	21.2	16.3	21.3	140,515	108,512	251,410	177,940	250,380
Poland	197	224	218	233	243	14.9	14.9	17.2	14.2	16.4	2,926	3,348	3,752	3,299	3,984
Russia, European and Asiatic	5,238	11,103	8,753	9,684	9,742	17.4	11.4	18.1	-------	-------	91,344	126,806	158,471	-------	-------
Total European countries reporting area and production, all years	23,957	26,492	28,735	27,751	28,623	20.1	13.8	23.8	21.2	21.7	481,691	364,826	682,885	586,962	620,831
Estimated European total, excluding Russia	25,200	27,900	30,200	29,100	29,900	-------	-------	-------	-------	-------	500,000	384,000	705,000	610,000	643,000
Africa:															
Morocco	437	599	600	649	837	8.3	11.5	9.1	9.2	4.4	3,629	6,864	5,455	5,990	3,715
Egypt	1,988	2,131	1,917	1,896	-------	34.8	36.8	36.2	36.9	-------	69,096	78,336	69,462	69,886	-------
Estimated African total	3,100	3,300	4,200	3,900	4,400	-------	-------	-------	-------	-------	83,000	102,000	108,000	96,000	105,000

Asia:															
India	5,937	6,731	6,641	6,530	-------	13.9	13.4	12.4	15.0	-------	82,482	90,240	82,440	97,680	-------
Japan	141	121	110	-------	-------	25.9	23.5	23.7	-------	-------	3,655	2,838	2,608	-------	-------
Manchuria	[2] 1,457	2,428	2,236	2,139	2,441	[2] 37.2	28.2	28.3	29.2	27.6	[3] 51,167	68,532	63,314	62,554	67,418
Chosen	231	255	261	263	-------	12.2	12.5	12.4	12.8	-------	2,829	3,190	3,237	3,366	-------
Kwantung	162	203	220	230	-------	17.1	21.4	21.5	20.7	-------	2,771	4,353	4,721	4,751	-------
Philippines	1,338	1,284	1,273	1,277	-------	12.4	13.1	11.1	11.5	-------	16,561	16,765	14,144	14,737	-------
Estimated Asiatic total	10,600	12,300	12,300	12,100	11,700	-------	-------	-------	-------	-------	187,000	215,000	205,000	216,000	221,000
Total Northern Hemisphere countries reporting area and production, all years	136,334	138,021	136,609	139,041	144,941	25.6	24.3	24.5	20.0	23.0	3,485,435	3,349,904	3,350,047	2,775,717	3,330,214
Estimated Northern Hemisphere total, excluding Russia	150,700	153,100	152,900	154,800	160,200	-------	-------	-------	-------	-------	3,738,000	3,626,000	3,631,000	3,058,000	3,623,000
SOUTHERN HEMISPHERE															
Brazil	6,980	12,192	-------	-------	-------	25.4	15.5	-------	-------	-------	177,338	188,891	173,878	-------	-------
Chile	62	115	94	92	89	23.6	24.3	25.0	29.4	-------	1,466	2,796	2,346	2,707	-------
Uruguay	470	437	452	452	-------	10.5	4.8	4.6	13.8	-------	4,919	2,082	2,082	6,241	-------
Argentina	8,063	9,026	10,428	11,315	[4] 14,468	28.2	26.6	26.9	32.9	-------	227,393	240,422	280,614	372,590	-------
Union of South Africa	4,456	5,370	6,290	4,371	-------	12.8	12.4	12.8	12.9	-------	56,890	66,753	80,383	56,175	-------
Southern Rhodesia	223	325	318	273	-------	18.3	20.1	21.5	17.0	-------	4,079	6,523	6,847	4,643	-------
Java and Madura	3,982	4,603	4,214	4,945	4,688	14.6	16.6	14.7	15.9	16.4	57,975	76,496	62,067	78,610	76,800
Australia	326	315	298	-------	-------	26.5	26.4	26.7	-------	-------	8,641	8,323	7,946	-------	-------
Total Southern Hemisphere countries reporting area and production, all years through 1930–31	17,256	19,876	21,796	21,448	-------	20.4	19.9	19.9	24.3	-------	352,722	395,072	434,339	520,966	-------
Estimated Southern Hemisphere total	26,100	36,300	33,600	32,400	32,700	-------	-------	-------	-------	-------	569,000	675,000	685,000	767,000	-------
Total Northern and Southern Hemisphere countries reporting area and production, all years through 1930–31	153,590	157,897	158,405	160,489	-------	25.0	23.7	23.9	20.5	-------	3,838,157	3,744,976	3,784,386	3,296,683	-------
Estimated world total, excluding Russia	176,800	189,400	186,500	187,200	192,900	-------	-------	-------	-------	-------	4,307,000	4,301,000	4,316,000	3,825,000	-------

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930–31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which takes place early in 1931.

[1] Preliminary. [2] 2-year average. [3] 3-year average. [4] Acreage sown.

TABLE 51.—*Corn: World production, 1900–01 to 1931–32*

Crop year	Estimated world production, excluding Russia	Estimated European production, excluding Russia	Selected countries						
			United States	Argentina	Rumania	Italy	Brazil	Yugoslavia	Russia[1]
	Million bushels	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*
1900–01	3,593	445	2,505	99	85	88	---------	18	34
1901–02	2,762	497	1,614	84	117	100	---------	19	68
1902–03	3,686	391	2,619	149	68	71	---------	18	49
1903–04	3,554	459	2,347	175	80	89	---------	19	51
1904–05	3,505	279	2,529	141	20	90	---------	9	26
1905–06	3,904	403	2,749	195	59	97	---------	21	34
1906–07	4,095	533	2,898	72	131	93	---------	28	92
1907–08	3,761	441	2,512	136	58	88	---------	18	64
1908–09	3,789	465	2,545	177	79	96	---------	21	82
1909–10	3,946	499	2,572	175	70	102	---------	34	55
1910–11	4,152	564	2,886	28	104	104	---------	29	102
1911–12	3,895	502	2,531	296	111	95	---------	27	95
1912–13	4,448	547	3,125	197	104	101	---------	---------	94
1913–14	3,944	576	2,447	263	115	111	---------	---------	84
1914–15	4,190	559	2,673	325	103	105	---------	---------	[2] 90
1915–16	4,351	520	2,995	161	86	122	---------	---------	[3] 72
1916–17	3,777	389	2,567	59	---------	82	204	---------	[4] 62
1917–18	4,178	351	3,065	171	---------	83	95	---------	---------
1918–19	3,579	299	2,503	224	---------	77	87	---------	---------
1919–20	4,237	454	2,811	259	[5] 141	86	197	---------	---------
1920–21	4,689	519	3,209	230	182	89	186	[5] 101	46
1921–22	4,311	393	3,069	176	111	92	181	74	46
1922–23	4,241	424	2,906	176	120	77	202	90	81
1923–24	4,523	469	3,054	277	153	89	180	85	67
1924–25	3,879	589	2,309	186	155	106	162	149	91
1925–26	4,581	626	2,916	322	164	110	162	149	172
1926–27	4,476	653	2,692	321	230	118	148	134	131
1927–28	4,314	485	2,763	312	139	87	130	83	118
1928–29	4,301	384	2,819	240	109	65	189	72	127
1929–30	4,316	705	2,535	281	251	100	174	163	158
1930–31	3,825	610	2,060	373	178	118	---------	136	---------
1931–32 [6]	---------	643	2,557	---------	250	78	---------	127	---------

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930–31 the crop harvested in Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which takes place early in 1931.

[1] Includes all Russian territory reporting for the years shown.
[2] Total Russian Empire exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.
[3] Exclusive of Russian Poland, Lithuania, parts of present Latvia and the Ukraine, and the Provinces of Batum and Elizabetpol in Transcaucasia.
[4] Beginning this year, estimates within present boundaries of the Union of Socialist Soviet Republics, exclusive of Turkestan, Transcaucasia, and the Far East, which territory in 1924–25 produced 26,048,000 bushels.
[5] Production in present boundaries beginning this year, therefore not comparable with earlier years.
[6] Preliminary.

TABLE 52.—*Corn: Monthly marketings, by farmers, as reported by about 3,500 mills and elevators, United States, 1921–22 to 1930–31*

Crop year	Percentage of year's receipts												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Season
1921–22	6.7	6.6	12.4	13.8	12.4	7.5	4.7	7.6	7.5	4.9	7.3	8.6	100.0
1922–23	8.2	8.7	13.6	10.7	11.0	6.6	5.3	6.1	6.4	6.8	7.5	9.1	100.0
1923–24	5.6	10.4	12.3	12.9	13.3	7.4	6.1	5.9	6.0	6.8	7.2	6.1	100.0
1924–25	7.0	11.1	13.0	13.6	9.5	8.1	6.3	7.8	4.3	6.6	6.2	6.5	100.0
1925–26	5.9	9.3	14.6	12.1	10.4	8.5	5.3	7.1	8.2	5.1	7.6	5.9	100.0
1926–27	10.1	9.1	12.9	11.7	10.8	6.9	4.8	6.1	9.1	5.7	6.2	6.6	100.0
1927–28	6.2	8.6	15.5	13.8	11.7	8.9	5.4	6.6	5.4	5.1	6.5	6.3	100.0
1928–29	6.6	12.5	16.7	12.9	11.5	7.4	3.8	4.3	7.3	5.8	5.8	5.4	100.0
1929–30	6.9	9.3	13.4	10.9	10.6	7.4	7.1	6.9	6.3	6.6	7.0	7.6	100.0
1930–31	7.5	9.3	13.0	10.0	9.9	8.2	7.7	5.5	7.5	7.4	8.2	5.8	100.0

Bureau of Agricultural Economics.

TABLE 53.—*Corn: Receipts at primary markets, 1921–22 to 1930–31*

Year beginning November	Chicago	St. Louis	Kansas City	Peoria	Omaha	Indianapolis	Total 10 markets [1]
	1,000 bush.	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*
1921–22	187,884	34,055	16,031	24,960	31,115	21,291	375,409
1922–23	116,711	30,263	15,595	21,284	23,308	18,839	253,590
1923–24	101,200	39,289	21,105	17,744	27,679	17,728	274,128
1924–25	80,700	23,185	21,470	21,234	13,345	17,613	202,504
1925–26	92,283	27,952	18,643	26,678	20,076	18,363	226,192
1926–27	91,880	21,039	14,767	23,292	20,482	19,977	217,881
1927–28	105,134	34,943	47,603	23,434	31,019	22,712	290,492
1928–29	95,099	38,517	34,536	27,390	16,276	25,519	268,609
1929–30	77,394	23,383	29,079	23,088	24,795	23,757	231,390
1930–31 [2]	59,365	13,014	25,929	8,842	17,488	21,925	170,039

Bureau of Agricultural Economics. Compiled from reports of Chicago Board of Trade, Duluth Board of Trade, Indianapolis Board of Trade, Kansas City Board of Trade, Omaha Grain Exchange, St. Louis Merchants Exchange, Milwaukee Chamber of Commerce, Minneapolis Chamber of Commerce, and Grain and Feed Journal.

[1] Includes also Milwaukee, Minneapolis, Duluth, and Toledo. [2] Preliminary.

TABLE 54.—*Shelled corn: Classification of receipts graded by licensed inspectors, all inspection points, total of all classes under each grade, 1917–18 to 1930–31*

Year beginning November	Grade							
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	Sample	Total
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
1917–18	2,281	18,714	58,562	56,240	45,610	44,621	98,844	324,872
1918–19	12,661	34,727	40,872	41,491	28,832	16,061	19,638	194,262
1919–20	28,517	47,961	38,774	56,647	27,313	9,188	13,058	221,458
1920–21	68,550	88,875	64,237	63,081	21,176	9,420	8,738	324,077
1921–22	30,970	197,254	115,207	42,880	21,963	15,979	4,951	429,204
1922–23	21,580	141,563	98,932	24,262	4,270	3,526	3,711	297,844
1923–24	3,038	59,592	111,932	69,365	35,905	15,410	10,742	305,984
1924–25	7,883	80,883	56,542	24,431	31,370	17,252	12,345	240,706
1925–26	3,358	59,985	62,757	51,092	48,348	40,116	31,473	297,129
1926–27	1,616	34,390	57,931	48,217	50,195	46,180	31,171	269,700
1927–28	9,682	87,801	78,352	47,890	34,638	27,553	29,006	314,932
1928–29	25,809	92,258	73,331	93,367	40,594	10,400	7,247	343,033
1929–30	26,394	85,038	49,806	50,916	39,995	19,475	16,580	288,204
1930–31	18,176	67,781	70,928	45,629	14,745	5,262	3,745	226,266

Bureau of Agricultural Economics.

TABLE 55.—*Corn: Visible supply in United States,*[1] *1922–23 to 1931–32*

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1922–23	8,806	11,072	16,760	21,658	27,529	28,742	22,339	6,734	3,366	2,373	1,587	2,052
1923–24	809	2,690	8,799	9,379	18,898	26,074	17,978	12,288	8,279	4,887	5,070	7,154
1924–25	8,097	7,563	18,573	27,571	32,292	32,727	23,379	17,140	13,094	6,093	6,524	5,470
1925–26	1,790	2,461	17,861	28,092	33,878	36,485	32,408	25,453	30,333	24,930	19,771	17,381
1926–27	22,258	28,699	34,712	38,792	45,103	47,244	36,621	29,961	34,427	30,205	22,312	23,687
1927–28	20,574	19,216	27,034	31,849	40,998	43,856	33,556	25,496	16,008	13,267	9,516	6,791
1928–29	2,030	6,419	17,146	26,042	33,302	34,150	25,687	14,259	13,054	8,751	5,417	4,197
1929–30	3,237	3,267	9,892	15,215	22,667	23,532	19,986	10,825	6,825	3,656	3,940	4,643
1930–31	4,379	6,964	16,390	16,757	18,961	20,447	18,270	11,412	7,815	8,183	8,846	5,362
1931–32	7,217	9,695	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

Bureau of Agricultural Economics. Compiled from the Chicago Daily Trade Bulletin.

[1] Saturday nearest the 1st of each month.

TABLE 56.—*Corn: Commercial stocks in store, 1926–27 to 1930–31*

DOMESTIC CORN IN UNITED STATES[1]

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1926–27	-------	-------	36,019	40,670	47,515	49,759	39,010	31,224	36,268	31,782	23,324	24,913
1927–28	21,661	20,254	28,741	30,717	44,786	48,273	36,835	27,497	17,650	12,304	9,768	6,894
1928–29	2,032	6,353	18,565	28,797	36,927	37,744	28,863	15,951	13,740	9,086	6,340	4,421
1929–30	3,639	2,982	8,228	16,079	24,944	25,671	21,073	11,463	7,049	3,421	4,220	4,710
1930–31	4,550	7,332	17,190	17,383	20,127	22,174	19,697	12,337	7,279	8,363	9,066	5,587
1931–32	7,341	9,803	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

UNITED STATES CORN IN CANADA

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
1926–27	-------	-------	2,147	1,715	1,788	1,403	1,781	1,452	1,184	1,706	1,188	2,010
1927–28	1,994	2,263	1,891	1,598	1,312	976	626	1,634	1,337	818	510	534
1928–29	252	268	580	737	601	356	1,759	1,602	911	746	480	987
1929–30	847	375	253	180	152	120	428	745	697	135	147	928
1930–31	750	723	571	481	423	388	476	995	176	195	557	500
1931–32	1,143	1,106	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

Bureau of Agricultural Economics. Compiled from weekly reports to the grain, hay, and feed market news service. Data are for stocks on the Saturday nearest the 1st day of the month.

[1] Includes corn in store in public and private elevators in 42 important markets and also the corn afloat in vessels or barges in the harbors of lake and seaboard ports. Corn in transit either by rail or water, mill stocks, or small private stocks of corn intended only for local purposes, not included.

TABLE 57.—*Corn: Estimated average price per bushel, received by producers, United States, 1922–23 to 1931–32*

Crop year	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	62.2	64.3	67.6	70.2	72.5	75.3	79.6	84.0	85.8	87.0	87.0	86.2	75.0
1923–24	84.8	78.3	72.2	73.6	76.5	77.2	78.2	78.6	80.8	98.3	107.4	109.7	82.3
1924–25	108.9	99.6	105.6	112.0	114.5	112.1	103.8	107.5	111.0	104.4	106.5	98.8	107.3
1925–26	83.0	74.6	70.7	69.6	68.5	66.6	65.7	67.1	68.6	71.5	79.5	76.2	71.4
1926–27	74.5	66.0	64.5	64.3	66.5	65.2	65.6	73.0	88.9	92.4	97.7	95.3	74.1
1927–28	87.6	73.7	75.1	75.2	79.0	86.2	91.9	102.5	102.2	102.4	98.2	95.1	85.3
1928–29	84.7	75.4	76.1	80.2	86.8	88.7	87.5	86.2	86.9	91.2	95.9	97.2	84.5
1929–30	91.9	81.0	78.0	77.3	77.4	74.5	78.3	77.7	79.0	77.1	90.0	91.7	80.9
1930–31	81.9	66.3	64.9	61.7	58.6	57.5	57.7	56.3	53.8	54.0	50.8	43.2	59.5
1931–32	33.4	36.6	34.5	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on 1st of month and 1st of succeeding month, October, 1922–December, 1923.

TABLE 58.—*Corn, including cornmeal in terms of grain: International trade, average 1925–26 to 1929–30, annual 1927–28 to 1930–31*

Country	Year beginning July									
	Average 1925–26 to 1929–30		1927–28		1928–29		1929–30		1930–31 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Argentina	220,588	0	279,455	0	243,424	0	168,585	0	274,027	0
Rumania	30,906	[2] 21	[3] 39,503	(3)	[3] 3,712	(3)	[3] 31,030	(3)	--------	--------
United States	23,233	1,637	19,409	5,463	41,874	490	10,281	496	3,318	1,747
Union of South Africa	19,446	376	17,843	300	18,769	129	18,361	52	23,547	30
Yugoslavia	[4] 8,534	--------	671	--------	534	--------	18,436	--------	--------	--------
Russia	[5] 5,673	--------	981	--------	--------	--------	--------	--------	--------	--------
Duth East Indies [6]	4,876	13	3,054	13	8,500	15	6,832	18	4,728	18
Hungary	4,043	508	2,028	688	802	1,124	6,109	350	628	3,275
Bulgaria	3,828	--------	2,366	--------	2,000	--------	5,610	--------	7,744	--------
Indo-China	3,554	0	2,979	0	[3] 4,363	[3] 0	[3] 5,400	[3] 0	[3] 5,004	[3] 0
Egypt	1,786	276	5,855	30	2,761	31	77	82	14	274
China [6]	1,040	0	490	0	945	0	2,022	0	1,063	0
British India	227	0	1,059	0	29	0	6	0	2	0
Total	327,734	2,831	375,693	6,494	327,713	1,789	272,749	998	320,075	5,344
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom	2,512	71,650	2,552	75,705	2,308	71,672	2,313	68,763	2,595	83,605
Netherlands	738	44,523	729	53,234	717	41,471	1,067	41,798	863	48,785
Germany	23	42,826	4	72,050	5	32,915	2	31,578	2	17,320
France	69	27,349	32	25,594	21	30,771	89	29,929	126	36,757
Belgium	1,080	24,268	1,121	27,317	1,096	22,630	1,023	21,895	1,585	27,232
Italy	42	23,942	24	21,135	16	40,971	26	27,240	16	25,257
Denmark	0	18,676	0	29,727	0	14,853	0	9,874	0	14,856
Irish Free State	124	16,159	152	16,847	142	17,536	61	16,607	63	20,672
Canada	58	13,645	41	15,151	98	14,815	34	14,010	42	9,819
Spain	0	13,003	0	12,561	0	12,450	0	9,915	--------	--------
Czechoslovakia	5	12,088	8	13,930	1	10,579	2	9,035	3	16,868
Austria	20	6,593	13	6,136	21	5,338	30	7,160	17	8,214
Sweden	--------	5,112	--------	7,752	--------	5,533	--------	3,853	--------	8,146
Switzerland	0	5,099	0	5,459	0	5,370	0	4,297	2	5,202
Norway	--------	4,588	--------	5,176	--------	3,642	--------	4,575	--------	6,101
Cuba	0	[4] 2,315	0	2,068	0	1,155	0	--------	0	--------
Mexico [6]	[4] 3	[4] 2,108	0	1,119	0	393	--------	--------	0	3,122
Poland	22	2,008	8	3,017	15	1,144	8	636	0	862
Japan	0	[4] 1,702	0	1,172	0	1,588	0	2,532	0	2,776
Greece	0	886	0	1,005	0	1,145	0	380	0	522
Australia	91	602	143	143	272	22	3	81	--------	--------
Tunis	17	424	1	1,145	17	1	13	1	15	647
Uruguay	561	[4] 406	3	527	2,364	274	394	--------	--------	--------
Algeria	14	214	25	240	14	106	11	61	--------	--------
Finland	0	190	0	206	0	293	0	261	0	346
Estonia	0	66	0	23	0	292	0	0	0	0
Total	5,379	340,442	4,856	398,439	7,107	336,959	5,076	304,481	5,329	337,109

Bureau of Agricultural Economics, official sources except where otherwise noted. Maicena or maizena is included with "corn and corn meal."

[1] Preliminary.
[2] 1 year only.
[3] Monthly Crop Report and Agricultural Statistics.
[4] 4-year average.
[5] 3-year average.
[6] Calendar year.

TABLE 59.—*Corn, No. 3, yellow: Weighted average price*[1] *per bushel of reported cash sales, Chicago, 1899–1900 to 1931–32*

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1899–1900	31	30	30	32	36	39	38	40	41	40	40	42	36
1900–01	37	35	36	37	39	42	43	42	48	56	56	56	43
1901–02	60	64	62	59	59	62	62	63	65	60	59	60	62
1902–03	53	46	43	43	41	41	46	49	51	53	51	45	47
1903–04	44	44	43	46	46	49	49	50	49	52	53	55	49
1904–05	48	43	42	44	47	48	50	55	57	54	53	53	48
1905–06	45	42	42	42	40	42	47	49	52	54	47	46	44
1906–07	43	42	41	43	43	44	52	53	54	57	64	65	50
1907–08	59	58	53	54	63	65	73	72	76	81	80	77	68
1908–09	63	59	64	65	66	69	73	75	72	70	69	59	65
1909–10	59	59	64	63	61	57	60	59	62	64	58	50	59
1910–11	49	45	45	45	45	50	54	55	63	65	67	73	53
1911–12	68	61	62	64	68	78	79	75	68	79	74	65	71
1912–13	52	46	46	48	49	55	57	60	62	74	75	70	53
1913–14	72	66	62	62	64	67	70	72	71	82	79	73	70
1914–15	67	64	71	74	72	75	77	74	78	81	74	65	70
1915–16	63	69	74	74	73	76	75	74	81	85	86	96	79
1916–17	98	92	98	100	109	140	159	170	199	206	210	203	111
1917–18	221	177	177	181	170	165	160	162	170	172	158	141	163
1918–19	133	145	143	127	153	162	174	178	192	195	155	141	162
1919–20	146	147	151	146	158	169	202	189	158	158	131	91	159
1920–21	77	75	65	63	62	57	60	63	60	56	53	45	62
1921–22	47	47	48	55	57	58	62	61	64	62	64	69	55
1922–23	71	73	70	72	73	79	82	84	88	88	89	104	73
1923–24	82	71	76	78	77	77	77	82	109	117	114	110	88
1924–25	111	120	124	122	117	105	115	113	108	102	91	82	106
1925–26	83	76	79	75	72	71	71	70	78	80	79	77	75
1926–27	71	75	74	73	68	71	87	99	102	109	97	84	87
1927–28	84	86	89	95	99	106	108	103	106	102	100	96	101
1928–29	84	83	93	94	94	90	87	91	99	101	101	95	92
1929–30	88	88	85	82	80	82	79	79	82	99	94	82	83
1930–31	71	69	65	61	60	58	56	58	57	46	42	38	60
1931–32	43	37	------	------	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from Chicago Daily Trade Bulletin.

[1] Average of daily prices weighted by car-lot sales.

TABLE 60.—*Corn: Weighted average price*[1] *per bushel of reported cash sales of all classes and grades, six markets*[2] *combined, 1921–22 to 1931–32*

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1921–22	45.6	45.7	46.0	53.3	55.4	56.5	59.6	59.3	62.1	60.1	62.3	69.4	55.7
1922–23	70.8	71.6	69.2	71.6	72.4	79.0	82.1	83.1	85.6	86.4	88.3	100.3	77.4
1923–24	74.9	67.5	72.8	73.7	72.7	74.7	75.4	82.7	106.6	114.4	113.7	109.2	83.0
1924–25	108.3	114.4	112.9	108.6	103.5	99.0	111.9	109.7	105.3	101.3	89.1	80.8	106.0
1925–26	71.0	68.3	69.5	63.2	64.6	66.4	68.0	66.9	76.3	78.3	76.5	73.2	69.0
1926–27	67.3	65.9	65.2	62.7	60.9	67.0	83.0	91.5	96.7	104.2	92.2	79.9	75.8
1927–28	78.7	77.0	78.6	84.1	89.6	98.2	104.0	100.8	102.7	96.8	97.5	89.3	89.2
1928–29	79.8	78.4	87.1	89.5	89.0	86.9	84.6	89.7	98.1	99.9	100.0	93.8	88.5
1929–30	81.0	79.1	77.7	75.9	73.5	80.2	78.5	77.8	80.6	97.6	93.2	80.3	80.3
1930–31	67.8	64.1	61.0	57.2	56.8	56.3	54.4	55.3	56.9	46.7	42.4	38.0	56.9
1931–32	43.5	37.1	------	------	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from Chicago Daily Trade Bulletin, St. Louis Daily Market Reporter, Omaha Daily Price Current, Kansas City Grain Market Review, Minneapolis Daily Market Record, Cincinnati Daily Trade Bulletin. The prices in this table are comparable with prices paid to producers in that the latter are averages of the several prices reported which cover all classes and grades sold by producers.

[1] Average of daily prices weighted by car-lot sales.

[2] Markets are Chicago, St. Louis, Omaha, Kansas City, Minneapolis, and Cincinnati (not included November, 1928–December, 1931).

TABLE 61.—*Corn, yellow, La Plata: Spot price per bushel of 56 pounds at Liverpool and Buenos Aires 1921–22 to 1931–32*

LIVERPOOL

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1921–22	78	88	92	108	108	103	106	101	110	110	109	108	102
1922–23	96	100	99	104	105	109	114	110	102	94	98	97	102
1923–24	96	102	103	115	111	107	112	100	94	104	114	124	107
1924–25	121	122	131	129	114	111	130	128	127	138	120	103	123
1925–26	107	110	97	91	89	94	89	87	100	98	90	93	95
1926–27	95	92	89	93	87	88	94	93	91	98	97	96	93
1927–28	97	104	110	119	127	129	127	125	123	119	107	116	117
1928–29	123	120	124	127	124	120	107	104	118	113	107	103	116
1929–30	99	89	84	79	75	91	85	76	84	90	77	62	83
1930–31	52	54	48	49	58	62	57	50	47	44	41	40	50
1931–32	44	37	------	------	------	------	------	------	------	------	------	------	------

BUENOS AIRES

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Average
1921–22	61	63	63	73	79	77	75	71	78	78	76	74	72
1922–23	70	74	80	82	81	80	77	75	73	69	74	78	76
1923–24	81	79	78	82	77	67	65	64	68	85	93	105	79
1924–25	106	107	112	108	96	92	100	92	93	96	91	82	98
1925–26	84	86	78	73	66	70	68	68	68	70	65	60	71
1926–27	56	55	60	63	62	60	60	63	70	76	77	76	65
1927–28	75	83	86	97	102	95	90	91	90	86	91	94	91
1928–29	97	93	97	99	90	91	79	87	87	87	87	84	90
1929–30	74	79	65	62	62	62	60	56	54	56	51	43	61
1930–31	34	33	29	31	35	30	30	30	30	26	24	25	30
1931–32	32	28	------	------	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from International Yearbook of Agricultural Statistics, 1921; subsequently Broomhall's Corn Trade News and Review of the River Plate. Average of weekly quotations. Conversions of Liverpool prices at monthly average rate of exchange as given in Federal Reserve Bulletins to December, 1925, inclusive, subsequently at par of exchange, except that, beginning with September, 1931, the monthly average of current rates of exchange was used. Buenos Aires prices are averages of weekly quotations, converted at monthly average rate of exchange as given in the Federal Reserve Bulletin.

TABLE 62.—*Corn: Volume of trading in futures, contract markets, by markets and by months, 1930–31*

Month	Chicago Board of Trade	Chicago Open Board	Kansas City	St. Louis	Milwaukee	Minneapolis
	1,000,000 bushels	*1,000,000 bushels*	*1,000,000 bushels*	*1,000,000 bushels*	*1,000,000 bushels*	*1,000,000 bushels*
November	381	10	24	½	2	---------
December	588	26	21	¼	4	---------
January	542	28	27	½	3	---------
February	427	20	21	¼	2	4
March	330	17	18	¼	2	3
April	342	11	23	½	2	2
May	317	10	17	¼	2	½
June	244	8	10	---------	2	½
July	353	13	13	½	1	¼
August	344	14	12	½	2	---------
September	221	8	7	¼	1	¼
October	229	8	7	¼	1	---------
Total	4,318	173	210	4	24	10

Grain Futures Administration.

TABLE 63.—*Corn: Volume of trading in futures on the Chicago Board of Trade by crop years, 1921–22 to 1930–31*

Crop year	Quantity	Crop year	Quantity	Crop year	Quantity
	bushels		*bushels*		*bushels*
1921–22	4, 180, 000, 000	1925–26	3, 863, 000, 000	1929–30	3, 799, 000, 000
1922–23	4, 535, 000, 000	1926–27	5, 982, 000, 000	1930–31	4, 318, 000, 000
1923–24	5, 202, 000, 000	1927–28	6, 589, 000, 000		
1924–25	6, 363, 000, 000	1928–29	4, 924, 000, 000		

Grain Futures Administration.

TABLE 64.—*Corn: Volume of trading in futures in all contract markets, by months, 1923–24 to 1930–31*

Months	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31
	1,000,000 bushels	*1,000,000 bushels*	*1,000,000 bushels*	*1,000,000 bushels*	*1,000,000 bushels*	*1,000,000 bushels*	*1,000,000 bushels*	*1,000,000 bushels*
November	394	557	317	383	473	457	261	418
December	285	707	514	395	681	420	199	649
January	457	710	302	261	511	690	196	600
February	338	677	236	288	698	373	252	474
March	442	810	317	429	733	416	328	370
April	323	670	292	313	745	466	283	380
May	288	510	237	692	699	526	290	346
June	426	566	343	921	567	475	322	265
July	565	463	448	575	553	520	498	381
August	740	394	439	713	616	453	611	373
September	695	442	368	836	372	296	433	238
October	678	335	340	588	467	269	461	246
Total	5,631	6,841	4,153	6,394	7,115	5,361	4,134	4,740

Grain Futures Administration.

TABLE 65.—*Oats: Acreage, production, value, exports, etc., United States, 1900–1931*

Year	Acreage harvested	Average yield per acre	Production	Price per bushel received by producers Dec 1.	Farm value, basis Dec. 1. farm price	Price per bushel at Chicago, year beginning Aug. 1[1]	Foreign trade, including meal, year beginning July [2]: Domestic exports	Imports	Net exports [3]: Total	Net exports [3]: Percentage of production
	1,000 acres	*Bushels of 32 lbs.*	*1,000 bushels*	*Cents*	*1,000 dollars*	*Cents*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*Percent*
1900	30,290	30.2	913,800	25.4	232,074	26	42,269	32	42,237	4.6
1901	29,894	26.0	778,392	39.7	308,796	43	13,278	39	13,240	1.7
1902	30,578	34.5	1,053,489	30.6	322,423	34	8,382	150	8,233	.8
1903	30,866	28.2	869,350	34.0	295,232	38	1,961	184	1,857	.2
1904	31,353	32.2	1,008,931	31.1	313,488	32	8,395	56	8,339	.8
1905	32,072	34.0	1,090,236	28.9	314,868	31	48,435	40	48,395	4.4
1906	33,353	31.0	1,035,576	31.9	329,853	37	6,386	91	6,379	.6
1907	33,641	23.9	805,108	44.5	358,421	50	2,519	383	2,195	.3
1908	34,006	25.0	850,540	47.3	402,010	52	2,334	6,692	[4] 4,252	
1909	*35,159*	*28.6*	*1,007,143*							
1909	35,159	30.4	1,068,289	40.6	433,869	42	2,549	1,063	1,704	.2
1910	37,548	31.6	1,186,341	34.4	408,388	33	3,846	140	3,707	.3
1911	37,763	24.4	922,298	45.0	414,663	50	2,678	2,660	30	(5)
1912	37,917	37.4	1,418,337	31.9	452,469	35	36,455	765	35,695	2.5
1913	38,399	29.2	1,121,768	39.2	439,596	40	2,749	22,333	[4] 18,853	
1914	38,442	29.7	1,141,060	43.8	499,431	50	100,609	670	100,158	8.8
1915	40,996	37.8	1,549,030	36.1	559,506	41	98,960	720	98,648	6.4
1916	41,527	30.1	1,251,837	52.4	655,928	54	95,106	841	94,348	7.5
1917	43,553	36.6	1,592,740	66.6	1,061,474	71	125,091	2,915	122,273	7.7
1918	44,349	34.7	1,538,124	70.9	1,090,322	70	109,005	838	108,167	7.0
1919	*37,991*	*27.8*	*1,055,183*							
1919	39,599	27.9	1,106,426	70.2	777,064	80	43,436	6,077	37,365	3.4
1920	42,726	33.8	1,445,936	45.6	658,737	51	9,391	3,827	5,831	.4
1921	45,537	23.0	1,045,174	29.8	311,268	35	21,237	1,824	19,422	1.8
1922	40,324	28.5	1,147,720	39.0	447,277	41	25,413	340	25,087	2.2
1923	40,245	30.5	1,227,139	40.8	500,282	45	8,796	4,271	4,550	.4
1924	*37,650*	*34.7*	*1,304,599*							
1924	41,811	34.0	1,423,317	47.6	677,550	50	16,777	3,067	13,926	1.0
1925	44,250	31.9	1,410,184	37.4	527,847	41	39,687	212	39,565	2.8
1926	42,861	26.6	1,141,945	39.2	447,710	43	15,041	135	14,988	1.3
1927	40,326	27.1	1,092,550	44.3	484,253	55	9,823	233	9,611	.9
1928	40,079	32.9	1,317,640	40.3	530,587	44	16,251	426	15,825	1.2
1929	38,148	29.3	1,118,414	42.6	475,998	44	7,966	175	7,791	.7
1930	39,729	32.2	1,277,764	31.5	402,713	35	3,123	659	2,464	.2
1931 [6]	39,722	28.0	1,112,142	23.1	256,483					

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text; italic figures are census returns. See 1927 Yearbook, p. 788, for data for earlier years.

[1] From Chicago Daily Trade Bulletin, averages of the daily cash quotations of No. 3 white oats weighted by car-lot sales.

[2] Compiled from Commerce and Navigation of the United States, 1900–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1926; January and June issues, 1927–1931; and official records of the Bureau of Foreign and Domestic Commerce. Oats—general imports, 1900–1931; oatmeal—general imports, 1900–1909; imports for consumption, 1910–1931.

[3] Total exports (domestic plus foreign) minus total imports.

[4] Net imports. Total imports minus total exports (domestic plus foreign).

[5] Less than 0.05 per cent.

[6] Preliminary.

TABLE 66.—*Oats: Acreage harvested and production, by States, average 1924–1928, annual 1928–1931*

State and division	Acreage harvested					Production				
	Average, 1924–1928	1928	1929	1930	1931[1]	Average, 1924–1928	1928	1929	1930	1931[1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Maine	125	114	120	120	118	4,646	3,876	4,548	4,740	3,776
New Hampshire	10	8	7	6	6	394	312	280	264	228
Vermont	71	58	55	56	61	2,217	1,595	1,705	1,848	1,952
Massachusetts	7	5	4	5	4	236	160	120	170	132
Rhode Island	2	2	2	2	2	71	56	70	70	62
Connecticut	11	8	7	8	8	313	196	210	256	232
New York	930	872	800	872	863	29,987	26,596	19,600	34,880	24,596
New Jersey	46	43	38	40	43	1,262	1,118	988	1,360	1,333
Pennsylvania	1,025	971	909	945	954	32,532	28,159	24,088	32,602	28,143
North Atlantic	2,226	2,081	1,942	2,054	2,059	71,658	62,068	51,609	76,190	60,454
Ohio	1,960	2,374	1,628	1,726	1,657	75,086	87,838	47,212	62,136	62,138
Indiana	1,998	2,337	1,872	1,966	1,966	62,818	86,469	53,352	57,211	61,339
Illinois	4,477	4,489	4,064	4,267	4,182	144,486	168,338	136,144	142,944	142,188
Michigan	1,537	1,534	1,265	1,354	1,435	51,200	51,389	35,546	48,744	43,768
Wisconsin	2,537	2,495	2,435	2,435	2,459	94,993	94,810	77,920	97,400	68,852
Minnesota	4,466	4,089	4,230	4,442	4,575	153,293	145,160	145,935	166,575	123,525
Iowa	6,188	6,150	6,043	6,303	6,026	223,326	236,160	215,131	233,211	186,806
Missouri	1,727	1,593	1,404	1,727	1,865	34,160	38,232	26,676	41,448	50,355
North Dakota	2,191	1,886	1,923	1,827	1,498	54,599	53,751	34,614	40,194	18,276
South Dakota	2,611	2,360	2,385	2,385	1,745	72,267	63,720	65,588	70,358	20,068
Nebraska	2,514	2,392	2,480	2,485	2,311	65,398	71,760	76,880	72,065	49,686
Kansas	1,414	1,249	1,150	1,334	1,494	30,487	31,725	24,150	36,685	41,085
North Central	33,620	32,948	30,879	32,251	31,213	1,062,113	1,129,352	939,148	1,068,971	868,086
Delaware	3	3	2	3	3	85	90	57	102	105
Maryland	53	55	47	49	67	1,508	1,512	1,316	1,470	2,010
Virginia	147	137	127	152	189	2,971	2,987	2,642	2,630	4,838
West Virginia	153	139	140	140	148	3,783	3,684	3,374	2,660	3,552
North Carolina	184	147	168	186	197	2,756	2,352	3,192	3,534	4,531
South Carolina	357	299	358	344	378	7,327	6,578	8,485	7,912	9,450
Georgia	285	212	289	246	332	5,028	4,134	5,809	5,043	7,968
Florida	10	9	8	8	9	131	135	112	120	162
South Atlantic	1,191	1,001	1,139	1,128	1,323	23,591	21,472	24,987	23,471	32,616
Kentucky	189	172	207	155	232	3,516	3,612	3,312	2,015	4,872
Tennessee	144	102	93	102	138	2,531	1,683	1,451	1,499	2,760
Alabama	97	58	98	90	153	1,625	928	1,960	1,440	3,366
Mississippi	38	26	34	20	50	707	520	748	360	1,325
Arkansas	161	94	92	94	160	2,889	1,786	1,748	1,739	4,160
Louisiana	14	15	16	13	26	312	368	400	260	754
Oklahoma	1,160	976	908	1,053	1,516	23,679	21,472	19,068	25,798	43,206
Texas	1,423	1,199	1,331	1,411	1,764	35,892	26,378	31,944	33,864	59,976
South Central	3,225	2,642	2,779	2,938	4,039	71,151	56,747	60,631	66,975	120,419
Montana	466	348	321	305	183	13,552	12,702	6,099	5,948	2,654
Idaho	137	127	140	133	116	4,635	4,699	4,830	4,921	3,944
Wyoming	139	147	165	140	98	3,815	3,969	4,042	3,150	1,764
Colorado	203	183	203	195	148	5,506	5,490	5,887	6,045	3,404
New Mexico	40	30	31	34	38	782	600	676	714	950
Arizona	11	9	7	10	12	309	297	175	300	360
Utah	51	47	49	46	43	1,811	1,762	1,877	1,840	1,290
Nevada	2	2	3	3	2	71	76	102	105	50
Washington	170	155	147	156	158	7,560	7,595	7,056	7,566	7,742
Oregon	278	253	253	240	223	7,879	7,843	9,108	8,880	7,136
California	106	106	90	96	67	2,696	2,968	2,187	2,688	1,273
Western	1,603	1,407	1,409	1,358	1,088	48,615	48,001	42,039	42,157	30,567
United States	41,865	40,079	38,148	39,729	39,722	1,277,127	1,317,640	1,118,414	1,277,764	1,112,142

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

[1] Preliminary.

TABLE 67.—*Oats: Yield per acre, average 1919–1928 and annual 1926–1931, and estimated price per bushel December 1, average 1925–1929 and annual 1926–1931, by States*

State and division	Yield per acre							Estimated price per bushel Dec. 1						
	Average 1919–1928	1926	1927	1928	1929	1930	1931	Average 1925–1929	1926	1927	1928	1929	1930	1931
	Bus.	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Maine	36.3	38.0	36.0	34.0	37.9	39.5	32.0	65	63	68	70	70	52	39
New Hampshire	37.7	41.0	39.0	39.0	40.0	44.0	38.0	67	65	70	65	70	54	42
Vermont	30.4	31.5	31.5	27.5	31.0	33.0	32.0	64	60	65	70	65	53	40
Massachusetts	31.8	34.0	28.0	32.0	30.0	34.0	33.0	69	70	70	70	70	52	40
Rhode Island	32.8	32.0	32.0	28.0	35.0	35.0	31.0	71	70	75	70	75	55	40
Connecticut	29.2	28.5	30.5	24.5	30.0	32.0	29.0	67	66	69	70	70	55	42
New York	29.8	30.5	32.5	30.5	24.5	40.0	28.5	54	50	55	54	58	44	33
New Jersey	26.6	29.0	31.0	26.0	26.0	34.0	31.0	53	50	53	53	57	48	30
Pennsylvania	30.2	32.0	32.0	29.0	26.5	34.5	29.5	53	49	54	53	57	48	32
North Atlantic	30.4	31.7	32.4	29.8	26.6	37.1	29.4	54.6	51.0	55.8	55.1	59.0	46.6	33.2
Ohio	35.0	40.5	32.0	37.0	29.0	36.0	37.5	42	39	45	42	45	35	23
Indiana	30.0	30.0	25.0	37.0	28.5	29.1	31.2	38	35	43	37	40	30	19
Illinois	32.0	26.5	25.5	37.5	33.5	33.5	34.0	38	35	43	38	40	29	20
Michigan	31.0	31.0	32.0	33.5	28.1	36.0	30.5	44	40	48	43	48	34	24
Wisconsin	35.2	34.5	35.0	38.0	32.0	40.0	28.0	42	40	47	43	44	33	27
Minnesota	32.6	27.0	26.0	35.5	34.5	37.5	27.0	35	34	40	35	37	25	21
Iowa	35.3	31.6	31.9	38.4	35.6	37.0	31.0	37	35	42	37	39	28	21
Missouri	20.1	17.0	15.0	24.0	19.0	24.0	27.0	44	42	47	42	47	39	22
North Dakota	23.1	17.5	21.0	28.5	18.0	22.0	12.2	31	33	35	30	32	20	19
South Dakota	28.0	11.0	28.5	27.0	27.5	29.5	11.5	33	36	36	33	34	21	22
Nebraska	27.2	20.0	26.5	30.0	31.0	29.0	21.5	38	40	40	38	38	28	24
Kansas	22.1	18.3	20.5	25.4	21.0	27.5	27.5	44	44	45	42	46	35	20
North Central	30.7	26.4	27.5	34.3	30.4	33.1	27.8	37.8	36.8	42.1	37.9	39.7	28.8	21.6
Delaware	26.7	28.0	29.0	30.0	28.5	34.0	35.0	62	59	68	60	57	50	30
Maryland	27.4	28.5	29.0	27.5	28.0	30.0	30.0	54	50	54	56	59	47	40
Virginia	19.2	22.5	19.5	21.8	20.8	17.3	25.6	66	63	64	64	67	60	34
West Virginia	23.7	26.0	22.5	26.5	24.1	19.0	24.0	62	59	64	63	64	59	35
North Carolina	15.8	14.0	14.5	16.0	19.0	19.0	23.0	74	69	72	78	75	68	38
South Carolina	21.7	22.0	20.5	22.0	23.7	23.0	25.0	80	67	75	88	80	74	39
Georgia	17.6	20.0	18.5	19.5	20.1	20.5	24.0	79	69	75	85	80	74	46
Florida	13.3	16.7	11.0	15.0	14.0	15.0	18.0	82	65	80	88	89	79	50
South Atlantic	19.9	21.1	19.6	21.5	21.9	20.8	24.7	72.8	65.0	70.6	76.3	74.7	68.1	39.5
Kentucky	17.8	19.5	15.5	21.0	16.0	13.0	21.0	58	53	60	57	59	53	29
Tennessee	17.0	20.5	14.0	16.5	15.6	14.7	20.0	60	55	60	60	62	53	33
Alabama	17.0	20.0	15.5	16.0	20.0	16.0	22.0	73	68	70	75	76	64	39
Mississippi	18.7	22.0	19.0	20.0	22.0	18.0	26.5	73	66	70	75	76	68	39
Arkansas	19.0	19.5	17.0	19.0	19.0	18.5	26.0	58	52	58	59	62	52	30
Louisiana	21.4	26.6	17.5	24.5	25.0	20.0	29.0	69	64	66	65	70	55	34
Oklahoma	21.0	22.0	16.5	22.0	21.0	24.5	28.5	45	37	44	47	48	38	19
Texas	25.0	34.0	22.0	22.0	24.0	24.0	34.0	50	38	47	51	51	42	20
South Central	22.1	27.1	19.2	21.5	21.8	22.8	29.8	50.2	40.3	48.0	51.1	52.3	42.0	21.5
Montana	28.2	26.0	39.0	36.5	19.0	19.5	14.5	48	53	44	41	51	31	33
Idaho	33.4	31.5	36.5	37.0	34.5	37.0	34.0	47	45	50	48	48	32	30
Wyoming	26.0	27.5	30.0	27.0	24.5	22.5	18.0	46	45	42	45	51	36	32
Colorado	27.9	26.0	29.0	30.0	29.0	31.0	23.0	47	44	48	45	48	36	30
New Mexico	20.8	24.0	22.0	20.0	21.8	21.0	25.0	59	56	56	60	60	55	36
Arizona	26.5	25.0	28.0	33.0	25.0	30.0	30.0	75	75	70	75	80	65	35
Utah	34.1	35.0	39.5	37.5	38.3	40.0	30.0	60	60	60	56	60	41	40
Nevada	36.8	28.0	39.0	38.0	34.0	35.0	25.0	65	62	65	65	70	52	46
Washington	45.4	44.0	48.5	49.0	48.0	48.5	49.0	55	53	56	55	59	36	32
Oregon	28.9	25.0	29.5	31.0	36.0	37.0	32.0	52	50	53	51	56	35	33
California	25.1	26.5	22.5	28.0	24.3	28.0	19.0	59	48	63	60	61	43	36
Western	30.4	28.6	34.3	34.1	29.8	31.0	28.1	50.9	50.4	49.5	48.5	53.9	35.9	32.5
United States	29.6	26.6	27.1	32.9	29.3	32.2	28.0	40.8	39.2	44.3	40.3	42.6	31.5	23.1

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

TABLE 68.—*Oats: World production, 1894–95 to 1931–32*

Crop year	Estimated world production, excluding Russia and China	Estimated European production, excluding Russia	Selected countries							
			United States	Russia [1]	Germany	France	Canada	Poland	England and Wales	Argentina
	Million bushels	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*	*Million bushels*
1894–95	2, 249	1, 451	662	774	453	294			119	
1895–96	2, 442	1, 432	824	717	430	306			105	
1896–97	2, 248	1, 376	707	800	411	296			93	
1897–98	2, 139	1, 282	699	664	394	253			99	1
1898–99	2, 389	1, 511	731	688	465	322			102	1
1899–1900	2, 503	1, 462	796	995	474	308			99	2
1900–01	2, 624	1, 454	914	854	489	285			99	2
1901–02	2, 344	1, 415	778	624	486	255			91	2
1902–03	2, 888	1, 576	1, 053	931	514	320			115	4
1903–04	2, 829	1, 649	869	800	542	344			109	3
1904–05	2, 716	1, 435	1, 009	1, 124	478	291			112	4
1905–06	2, 823	1, 460	1, 090	937	451	306			99	6
1906–07	3, 673	1, 683	1, 036	714	581	295			109	12
1907–08	2, 861	1, 768	805	921	630	353			121	34
1908–09	2, 832	1, 632	851	959	530	327	266		106	32
1909–10	3, 415	1, 863	1, 068	1, 163	629	383	376		104	36
1910–11	3, 223	1, 660	1, 186	1, 065	544	332	259		104	47
1911–12	3, 135	1, 683	922	876	531	349	388		96	69
1912–13	3, 700	1, 720	1, 418	1, 089	587	355	416		89	76
1913–14	3, 580	1, 909	1, 122	1, 251	669	357	430		91	43
1914–15	3, 266	1, 681	1, 141	[2] 915	623	318	333		93	49
1915–16	3, 594	1, 401	1, 549	[3] 897	412	239	494		101	75
1916–17	3, 259	1, 469	1, 252	[4] 845	484	277	436		102	32
1917–18	3, 217	1, 047	1, 593	761	[5] 250	[5] 220	428		106	69
1918–19	3, 216	1, 117	1, 538		302	181	453		141	34
1919–20	3, 039	1, 318	1, 184		310	180	419	76	110	31
1920–21	3, 645	1, 476	1, 496	486	332	291	564	129	103	51
1921–22	3, 102	1, 451	1, 078	359	345	244	453	92	100	31
1922–23	3, 341	1, 471	1, 216	409	277	288	522	110	88	56
1923–24	3, 791	1, 719	1, 306	405	421	337	599	153	95	76
1924–25	3, 652	1, 572	1, 503	603	390	306	431	106	105	53
1925–26	3, 790	1, 709	1, 488	838	385	328	427	144	97	80
1926–27	3, 639	1, 843	1, 247	1, 071	436	364	407	134	104	66
1927–28	3, 526	1, 748	1, 183	917	437	343	467	147	94	52
1928–29	3, 950	1, 879	1, 439	1, 135	482	340	480	172	101	65
1929–30	3, 647	2, 060	1, 118	1, 144	509	373	301	203	107	68
1930–31	3, 600	1, 728	1, 278		390	303	450	162	94	53
1931–32 [6]	3, 350	1, 735	1, 112		427	344	349	165	87	65

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930–31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends in 1931.

[1] Includes all Russian territory reporting for the years shown.
[2] Total Russian Empire, exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.
[3] Exclusive of Russian Poland, Lithuania, parts of present Latvia and the Ukraine, and the Provinces of Batum and Elizabetpol, in Transcaucasia.
[4] Beginning this year, estimates for the present territory of the Union of Socialist Soviet Republics, exclusive of Turkestan, Transcaucasia, and the Far East, which territory in 1924–25 produced 20,248,000 bushels.
[5] Beginning with this year postwar boundaries and therefore not comparable with earlier years.
[6] Preliminary.

TABLE 69.—*Oats: Acreage, yield per acre, and production in specified countries, average 1921–22 to 1925–26, annual 1928–29 to 1931–32*

Country	Acreage					Yield per acre					Production				
	Average, 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32 [1]	Average, 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32 [1]	Average, 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32 [1]
NORTHERN HEMISPHERE															
North America:	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Canada	14, 585	13, 137	12, 479	13, 259	12, 871	33. 4	36. 6	24. 1	33. 9	27. 1	486, 570	480, 413	300, 516	449, 595	348, 795
United States	42, 850	41, 734	38, 148	39, 729	39, 722	30. 8	34. 5	29. 3	32. 2	28. 0	1, 318, 021	1, 439, 407	1, 118, 414	1, 277, 764	1, 112, 142
Total	57, 435	54, 871	50, 627	52, 988	52, 593	31. 4	35. 0	28. 0	32. 6	27. 8	1, 804, 591	1, 919, 820	1, 418, 930	1, 727, 359	1, 460, 937
Europe:															
England and Wales	2, 039	1, 762	1, 854	1, 778	1, 652	47. 5	57. 3	57. 8	52. 8	52. 5	96, 796	101, 017	107, 240	93, 902	86, 793
Scotland	970	878	889	862	835	49. 0	56. 1	59. 4	52. 5	52. 1	47, 563	49, 280	52, 850	45, 290	43, 540
Irish Free State	736	649	666	644	623	49. 3	68. 7	72. 5	68. 7	-------	36, 310	44, 610	48, 257	44, 250	---------
Northern Ireland	344	307	314	307	286	54. 0	63. 0	63. 9	63. 2	-------	18, 582	19, 356	20, 072	19, 403	---------
Norway	274	246	239	239	237	41. 6	51. 5	50. 8	57. 0	44. 0	11, 406	12, 680	12, 146	13, 621	10, 433
Sweden	1, 807	1, 713	1, 748	1, 628	1, 589	41. 7	47. 0	49. 2	48. 6	42. 4	75, 374	80, 471	86, 067	79, 058	67, 310
Denmark	1, 118	999	979	958	935	54. 2	73. 0	72. 8	71. 7	69. 3	60, 542	72, 960	71, 276	68, 725	64, 760
Netherlands	380	377	396	370	366	51. 4	65. 8	65. 1	55. 3	51. 8	19, 531	24, 801	25, 776	20, 454	18, 960
Belgium	656	667	744	674	728	62. 4	72. 7	69. 2	56. 7	55. 7	40, 954	48, 524	51, 487	38, 223	40, 581
Luxemburg	70	71	77	70	70	30. 4	42. 3	47. 0	39. 3	39. 3	2, 130	3, 001	3, 617	2, 750	2, 749
France	8, 521	8, 657	8, 510	8, 557	8, 638	35. 3	39. 3	43. 8	35. 4	39. 8	300, 569	340, 252	373, 142	302, 747	344, 220
Spain	1, 623	1, 956	1, 839	1, 940	1, 986	22. 3	18. 2	24. 9	25. 8	21. 0	36, 175	35, 609	45, 812	49, 995	41, 670
Portugal	563	481	432	429	371	11. 4	10. 5	12. 9	18. 1	-------	6, 422	5, 053	5, 571	7, 778	---------
Italy	1, 189	1, 287	1, 293	1, 262	1, 222	31. 8	37. 6	37. 3	29. 2	34. 1	37, 767	48, 412	48, 261	36, 828	41, 657
Switzerland	51	51	50	49	45	54. 7	57. 4	57. 9	50. 2	59. 1	2, 788	2, 928	2, 894	2, 460	2, 659
Germany	8, 246	8, 696	8, 793	8, 499	8, 310	44. 1	55. 4	57. 8	45. 9	51. 4	363, 272	481, 960	508, 633	389, 688	427, 479
Austria	739	744	733	772	720	30. 5	42. 8	42. 4	35. 8	31. 9	22, 556	31, 841	31, 074	27, 606	22, 955
Czechoslovakia	2, 039	2, 069	2, 143	2, 049	2, 116	40. 2	47. 4	48. 0	44. 0	39. 2	82, 029	98, 055	102, 927	90, 100	82, 893
Hungary	785	652	745	608	612	28. 8	42. 2	38. 0	29. 6	20. 6	22, 644	27, 529	28, 292	17, 998	12, 636
Yugoslavia	923	913	953	1, 038	983	22. 4	27. 6	25. 4	18. 9	18. 6	20, 644	25, 236	24, 166	19, 634	18, 242
Greece	206	277	253	359	-------	20. 3	18. 9	16. 5	16. 7	-------	4, 187	5, 246	4, 179	5, 991	6, 614
Bulgaria	362	298	388	345	295	19. 6	20. 6	24. 3	22. 1	29. 2	7, 100	6, 139	9, 434	7, 616	8, 605
Rumania	3, 133	2, 759	2, 997	2, 686	2, 153	20. 1	24. 5	31. 2	29. 7	21. 4	62, 819	67, 546	93, 647	79, 678	46, 159
Poland	4, 446	5, 036	5, 415	5, 404	5, 367	27. 2	34. 2	37. 6	29. 9	30. 7	120, 813	172, 076	203, 450	161, 736	164, 656
Lithuania	842	712	845	855	900	27. 4	25. 8	35. 8	31. 4	32. 7	23, 078	18, 377	30, 233	26, 871	29, 427
Latvia	740	590	749	790	795	24. 6	17. 0	31. 3	29. 8	31. 0	18, 206	10, 037	23, 433	23, 537	24, 631
Estonia	[2] 390	320	371	368	367	[2] 23. 3	21. 3	27. 7	29. 5	29. 2	9, 505	6, 817	10, 277	10, 870	10, 723
Finland	1, 058	1, 140	1, 074	1, 137	1, 149	32. 6	34. 4	33. 1	36. 5	39. 9	34, 529	39, 254	35, 498	41, 458	45, 886

Russia, European and Asiatic	25,776	42,640	46,621	44,266	42,497	20.3	26.6	24.5			522,905	1,135,369	1,144,325		
Total Europe reporting area and production, all years	42,401	42,593	43,824	42,938	42,070	35.8	42.4	45.2	38.4	39.4	1,518,790	1,804,802	1,981,632	1,650,845	1,659,624
Estimated European total, excluding Russia	44,300	44,400	45,600	44,700	43,700						1,584,000	1,879,000	2,060,000	1,728,000	1,735,000
Africa:															
Morocco	35	74	116	103	73	18.4	24.0	29.4	22.9	32.3	645	1,775	3,413	2,357	2,359
Algeria	605	601	639	635	542	21.0	24.1	23.1	26.1	20.1	12,713	14,492	14,785	16,561	10,885
Tunis	126	104	133	124	99	19.4	29.5	25.9	16.7	32.7	2,439	3,066	3,445	2,067	3,238
Total	766	779	888	862	714	20.6	24.8	24.4	24.3	23.1	15,797	19,333	21,643	20,985	16,482
Asia:															
Turkey	[3] 216	307	426	374		[4] 47.5	17.6	23.6	26.7		[4] 11,391	5,402	10,039	10,000	
Syria and Lebanon	[2] 26	27	28	28	27	[2] 16.7	19.3	25.6	19.5	21.1	[2] 435	522	718	547	570
Japan	278	285	289	297		39.0	40.4	38.2	42.3		10,847	11,518	11,045	12,558	
Chosen	276	265	270	270		16.5	15.3	16.2	16.0		4,545	4,061	4,370	4,311	
Total Northern Hemisphere reporting area and production, all years	100,628	98,270	95,367	96,816	95,404	33.2	38.1	35.9	35.1	32.9	3,339,613	3,744,477	3,422,923	3,399,736	3,137,613
Estimated Northern Hemisphere total excluding Russia and China	103,300	101,000	98,200	99,600	97,900						3,434,000	3,841,000	3,528,000	3,506,000	3,242,000
SOUTHERN HEMISPHERE															
Brazil	16	15				30.1	33.4				482	501			
Chile	106	220	297	193	166	37.3	32.4	35.0	26.5		3,954	7,125	10,400	5,109	
Uruguay	120	132	206	179	214	18.1	19.2	18.8	7.7	14.6	2,166	2,529	3,877	1,376	3,132
Argentina	1,824	2,199	2,160	2,051	[5] 3,470	32.5	29.6	31.6	25.7	[6] 18.9	59,286	65,172	68,293	52,711	65,449
Union of South Africa	645	624	688	535		10.3	12.6	15.0	11.1		6,624	7,844	10,289	5,920	
Australia	1,000	1,046	1,516	1,126		19.0	16.9	11.9	18.4		19,010	17,636	18,030	20,699	
New Zealand	125	73	68	74		48.0	51.2	53.8	58.3		5,996	3,736	3,659	4,314	
Total Northern and Southern Hemisphere countries reporting area and production, all years	102,572	100,601	97,733	99,046	99,088	33.2	37.9	35.8	34.9	32.4	3,401,065	3,812,178	3,495,093	3,453,823	3,206,194
Estimated world total, excluding Russia and China	107,300	105,400	103,200	103,800	102,600						3,535,000	3,950,000	3,647,000	3,600,000	3,350,000

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930–31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

[1] Preliminary. [2] 4-year average. [3] 2-year average. [4] 1 year only. [5] Acreage sown. [6] Yield per acre sown.

TABLE 70.—*Oats: Monthly marketings by farmers, as reported by about 3,500 mills and elevators, United States, 1921–22 to 1930–31*

Crop year	Percentage of year's receipts												
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Season
1921–22	16.5	11.8	7.9	5.3	6.1	7.3	6.9	5.6	4.3	7.2	6.0	15.1	100.0
1922–23	15.7	11.9	10.1	7.8	8.6	7.4	7.1	6.5	4.7	5.4	5.9	8.9	100.0
1923–24	17.7	14.1	11.5	6.8	7.6	7.7	7.9	5.2	4.8	4.8	4.9	7.0	100.0
1924–25	20.7	17.8	11.5	5.6	4.8	4.7	3.5	3.9	3.9	5.0	4.6	14.0	100.0
1925–26	22.2	13.2	9.3	6.3	6.8	6.1	6.2	5.2	4.2	4.5	5.6	10.4	100.0
1926–27	21.8	11.7	8.7	5.8	6.4	6.1	6.7	5.6	4.4	5.5	6.4	10.9	100.0
1927–28	22.7	13.8	9.7	5.7	6.7	6.3	6.3	6.2	3.8	4.1	5.4	9.3	100.0
1928–29	23.4	13.8	10.2	5.8	7.4	5.6	6.5	5.1	4.9	4.3	6.2	6.8	100.0
1929–30	30.9	13.0	8.2	4.6	5.1	3.8	5.1	4.5	5.1	4.3	4.9	10.5	100.0
1930–31	29.1	13.1	8.4	4.2	4.5	4.1	5.1	4.1	4.8	3.5	5.4	13.7	100.0

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TABLE 71.—*Oats: Receipts at primary markets, 1921–22 to 1930–31*

Year beginning August	Chicago	Minneapolis	St. Louis	Milwaukee	Peoria	Omaha	Total 10 markets [1]
	1,000 bush.	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*
1921–22	78,042	33,072	26,118	23,612	13,485	10,964	215,715
1922–23	85,169	25,706	33,261	22,780	15,947	14,886	224,104
1923–24	69,902	29,259	35,791	20,496	13,406	18,385	219,972
1924–25	74,698	54,886	34,724	20,542	11,164	16,023	261,562
1925–26	50,660	36,616	28,662	14,165	9,749	13,124	207,723
1926–27	49,420	18,170	19,746	14,857	8,256	6,636	140,031
1927–28	53,609	27,313	19,394	10,506	8,906	8,858	155,307
1928–29	40,954	20,827	24,421	7,534	7,305	6,832	138,058
1929–30	34,691	21,534	19,263	12,524	7,718	9,280	133,251
1930–31 [2]	21,825	17,061	9,741	8,290	4,581	4,550	93,770

Bureau of Agricultural Economics. Compiled from reports of Chicago Board or Trade, Duluth Board of Trade, Indianapolis Board of Trade, Kansas City Board of Trade, Omaha Grain Exchange, St. Louis Merchants Exchange, Milwaukee Chamber of Commerce, Minneapolis Chamber of Commerce, and Grain and Feed Journal.

[1] Includes also Duluth, Toledo, Kansas City, and Indianapolis.
[2] Preliminary.

TABLE 72.—*Oats: Classification of receipts granted by licensed inspectors, all inspection points, total of all classes under each grade, 1919–20 to 1930–31*

Year beginning August	Grade					
	No. 1	No. 2	No. 3	No. 4	Sample	Total
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
1919–20	5,652	51,006	94,497	15,805	3,537	170,497
1920–21	8,803	60,169	73,072	14,766	6,831	163,641
1921–22	2,519	31,643	105,103	31,774	6,664	177,703
1922–23	2,548	47,348	95,984	17,004	4,640	167,524
1923–24	2,724	41,530	90,759	22,643	11,307	168,963
1924–25	1,489	33,631	110,377	24,580	14,853	184,930
1925–26	2,197	53,587	75,634	17,989	6,260	155,667
1926–27	1,465	19,692	49,581	28,548	17,695	116,981
1927–28	2,838	29,106	64,444	19,397	5,728	121,513
1928–29	4,408	14,144	77,823	20,684	9,305	126,364
1929–30	4,106	26,053	71,757	11,822	3,097	116,835
1930–31	10,344	36,939	35,186	8,137	983	91,589

Bureau of Agricultural Economics.

TABLE 73.—*Oats: Visible supply in United States,*[1] *1922–23 to 1931–32*

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1922–23	36, 667	38, 355	35, 968	34, 077	32, 940	32, 391	30, 861	27, 683	24, 044	21, 932	13, 514	8, 523
1923–24	5, 477	10, 111	16, 514	20, 488	18, 686	19, 940	17, 539	17, 741	16, 715	10, 656	6, 720	5, 264
1924–25	3, 086	11, 403	52, 715	66, 564	67, 265	72, 128	73, 570	72, 386	61, 104	48, 082	35, 331	33, 263
1925–26	26, 298	50, 706	65, 818	64, 926	64, 251	63, 187	63, 076	58, 974	52, 023	47, 025	38, 976	37, 900
1926–27	33, 772	43, 671	48, 450	48, 097	48, 288	44, 927	45, 422	43, 454	37, 145	29, 573	20, 502	17, 790
1927–28	12, 001	21, 501	24, 931	23, 857	23, 252	21, 907	20, 350	19, 791	15, 746	11, 168	7, 086	3, 225
1928–29	2, 377	13, 376	15, 193	14, 472	13, 295	13, 968	13, 611	14, 898	12, 609	10, 276	9, 280	7, 430
1929–30	7, 626	23, 488	26, 321	30, 155	27, 534	26, 496	24, 471	21, 673	18, 349	16, 242	12, 652	10, 875
1930–31	8, 467	23, 230	30, 495	30, 815	28, 269	28, 226	24, 565	21, 229	16, 966	13, 152	9, 439	7, 242
1931–32	6, 489	13, 849	15, 933	17, 259	16, 888	-------	-------	-------	-------	-------	-------	-------

Bureau of Agricultural Economics. Compiled from the Chicago Daily Trade Bulletin.

[1] Saturday nearest the 1st of each month.

TABLE 74.—*Oats: Commercial stocks in store, 1926–27 to 1931–32*

DOMESTIC OATS IN UNITED STATES[1]

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,00 bushels*
1926–27	-------	-------	-------	-------	-------	47, 123	47, 421	45, 105	38, 481	30, 513	22, 553	17, 686
1927–28	11, 886	23, 224	26, 513	25, 682	24, 784	23, 815	20, 006	21, 127	16, 803	11, 667	7, 171	3, 338
1928–29	1, 939	15, 992	17, 561	16, 900	15, 399	17, 314	16, 219	16, 800	14, 003	11, 493	10, 591	8, 592
1929–30	8, 668	24, 318	28, 597	32, 762	30, 064	29, 568	26, 097	22, 937	19, 484	16, 519	13, 247	11, 028
1930–31	9, 102	25, 844	32, 904	33, 265	30, 504	30, 896	26, 770	23, 029	19, 055	13, 930	9, 681	8, 042
1931–32	8, 021	15, 013	17, 372	18, 180	18, 161	-------	-------	-------	-------	-------	-------	-------

UNITED STATES OATS IN CANADA

1926–27	-------	-------	-------	-------	-------	352	247	218	164	635	1, 432	1, 759
1927–28	1, 253	1, 238	1, 435	1, 110	825	670	563	438	216	57	239	60
1928–29	4	978	2, 326	1, 031	547	644	494	424	309	716	529	346
1929–30	334	2, 177	4, 711	4, 435	4, 410	3, 735	3, 236	2, 852	2, 407	1, 934	1, 580	936
1930–31	1, 106	2, 679	2, 524	2, 425	2, 103	1, 475	1, 110	834	640	821	936	584
1931–32	207	110	199	230	467	-------	-------	-------	-------	-------	-------	-------

CANADIAN OATS IN UNITED STATES[2]

1926–27	-------	-------	-------	-------	-------	228	228	171	66	117	321	19
1927–28	24	26	0	139	296	609	312	247	117	21	199	122
1928–29	101	123	141	211	711	900	704	801	516	722	577	377
1929–30	341	341	283	426	670	699	634	615	488	330	264	91
1930–31	146	21	55	27	7	255	167	3	17	78	238	73
1931–32	13	41	41	41	32	-------	-------	-------	-------	-------	-------	-------

Bureau of Agricultural Economics. Compiled from weekly reports to the Grain, Hay, and Feed Market News Service. Data are for stocks on the Saturday nearest the 1st day of the month.

[1] Includes oats in store in public and private elevators in 42 important markets and also the oats afloat in vessels or barges in the harbors of lake and seaboard ports. Oats in transit either by rail or water, mill stocks, or small private stocks of oats intended only for local purposes, not included.

[2] Includes oats stored at lake and seaboard ports, exclusive of oats in transit on lakes and canals.

TABLE 75.—*Oats including oatmeal in terms of grain: International trade, average 1925–26 to 1929–30, annual 1927–28 to 1930–31*

Country	Year beginning July									
	Average 1925–26—1929-30		1927–28		1928–29		1929–30		1930–31 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Argentina	29,280	[2] 91	28,831	80	25,690	-------	20,181	-------	45,036	123
Germany	20,070	15,581	13,318	16,522	25,833	9,961	47,940	3,964	1,752	2,751
United States	17,754	207	9,823	202	16,251	399	7,966	152	3,123	638
Canada	16,656	2,899	10,194	2,770	19,532	3,452	4,600	3,980	10,336	714
Chile	3,861	-------	4,333	-------	2,761	-------	1,925	-------	6,512	-------
Czechoslovakia	3,676	1,260	5,862	530	4,453	300	4,424	402	2,408	70
Irish Free State	3,305	1,559	5,740	560	2,404	1,271	2,141	1,279	847	1,819
Rumania	3,302	2	2,611	1	[3] 936	[3] 0	[3] 4,974	[3] 0	[3] 6,201	[3] 0
Poland	2,713	1,499	658	1,619	267	1,465	5,667	257	858	55
Hungary	2,134	2	1,199	1	790	1	2,492	1	73	363
Russia	[4] 2,078	0	3,251	0	48	0	-------	-------	-------	-------
Algeria	1,764	588	1,565	498	3,206	306	1,351	506	-------	-------
Tunis	1,556	81	414	282	2,242	0	2,614	0	1,901	24
Yugoslavia [5]	495	[2] 48	493	25	325	71	28	48	6	380
Total	108,644	23,817	88,292	23,090	104,738	17,226	106,303	10,589	79,053	6,937
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom	1,170	30,339	713	31,309	1,020	25,862	958	33,196	1,237	35,576
Switzerland	5	10,936	4	9,770	5	10,741	6	13,613	13	14,263
Belgium	46	8,210	30	6,607	15	9,357	40	8,894	49	10,794
Netherlands	412	7,851	260	6,938	773	6,486	576	11,902	1,173	10,659
Italy	9	7,016	1	9,064	1	5,429	2	5,119	1	12,001
France	648	6,598	1,735	2,490	396	7,292	234	5,792	76	6,509
Austria	8	6,092	12	5,303	6	5,774	5	8,684	13	6,589
Denmark	217	3,255	123	2,155	326	2,574	62	8,783	65	4,586
Sweden	902	2,956	536	2,215	720	4,172	490	3,853	451	3,779
Finland	25	1,891	92	990	13	3,504	0	2,155	24	963
Cuba	0	[4] 1,215	0	1,051	0	987	-------	-------	-------	-------
Latvia [6]	110	1,127	3	1,223	0	2,883	512	309	14	179
Norway	8	714	5	683	9	336	10	556	13	58
Estonia	0	693	0	651	0	1,356	0	389	0	534
Greece	0	[4] 348	0	200	0	108	0	660	0	3
Australia	155	276	111	670	144	69	184	38	[3] 234	[3] 7
Union of South Africa	148	160	134	141	143	120	169	107	84	104
Japan [6]	0	96	0	6	0	76	0	100	-------	-------
Total	3,863	89,773	3,759	81,466	3,751	87,126	3,248	104,150	3,447	106,604

Bureau of Agricultural Economics. Official sources except where otherwise noted.

[1] Preliminary.
[2] 3-year average.
[3] Monthly Crop Report and Agricultural Statistics.
[4] 4-year average.
[5] Calendar year.
[6] Year beginning August 1, International Yearbook of Agricultural Statistics.

TABLE 76.—*Oats: Estimated average price per bushel received by producers, United States, 1922–23 to 1931–32*

Crop Year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	33.6	33.4	36.4	38.8	40.3	41.5	42.4	43.5	44.8	45.3	43.7	40.2	39.0
1923–24	37.6	38.0	39.4	40.8	42.6	43.4	45.4	46.2	46.5	46.3	46.8	49.4	42.6
1924–25	49.1	47.1	48.9	47.4	50.6	54.0	53.4	49.7	44.7	45.4	48.3	45.3	48.3
1925–26	40.7	38.1	37.2	37.6	39.1	40.0	39.2	38.8	39.4	39.5	38.9	37.7	39.0
1926–27	37.9	35.6	39.0	39.8	41.1	42.6	43.4	43.4	43.2	45.4	48.0	46.3	41.2
1927–28	44.4	43.9	44.6	45.1	48.1	49.3	51.3	54.5	56.9	62.0	61.4	56.2	48.9
1928–29	38.4	36.7	39.0	39.8	42.5	43.7	47.0	46.6	45.8	44.6	42.5	42.9	41.1
1929–30	42.7	44.1	44.8	43.1	43.6	43.1	43.0	41.4	42.4	40.9	39.3	33.1	41.9
1930–31	35.7	36.1	34.7	31.5	32.3	31.1	30.7	30.1	30.2	28.6	26.1	23.3	31.9
1931–32	19.8	20.0	20.1	23.2	23.0	------	------	------	------	------	------	------	--------

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on 1st of month and 1st of succeeding month, August, 1922–December, 1923.

TABLE 77.—*Oats, No. 3, white: Weighted average price* [1] *per bushel of reported cash sales, Chicago, 1909–10 to 1931–32*

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1909–10	38	39	40	40	44	48	47	44	42	40	38	41	42
1910–11	35	34	32	32	32	33	31	31	32	34	39	44	33
1911–12	41	45	47	48	47	50	52	53	57	55	53	49	50
1912–13	33	33	33	32	33	33	33	32	35	38	40	40	35
1913–14	42	43	40	40	40	39	39	39	39	40	40	37	40
1914–15	42	48	46	48	49	53	58	57	57	54	49	53	50
1915–16	41	34	36	36	42	48	45	42	44	43	39	41	41
1916–17	44	46	49	55	53	57	56	61	69	70	67	78	54
1917–18	61	60	60	65	77	82	89	93	89	77	77	77	71
1918–19	70	72	69	72	72	65	58	63	70	69	70	78	70
1919–20	73	68	70	73	82	86	86	93	101	109	113	91	80
1920–21	70	62	54	51	48	44	42	42	36	39	37	34	51
1921–22	32	35	31	33	34	34	36	36	38	38	37	36	35
1922–23	32	38	42	43	44	43	44	45	46	45	43	40	41
1923–24	38	40	43	43	44	46	48	47	48	48	51	54	45
1924–25	50	48	50	50	58	58	53	48	42	45	49	44	50
1925–26	41	39	39	40	42	42	41	40	42	41	40	42	41
1926–27	38	38	44	42	46	46	43	44	45	50	49	45	43
1927–28	47	47	48	49	54	55	56	59	63	67	68	56	55
1928–29	38	41	42	44	46	50	50	48	48	45	45	47	44
1929–30	43	48	47	45	45	45	44	43	43	41	38	35	44
1930–31	39	38	36	33	34	32	32	31	30	28	27	23	35
1931–32	21	22	23	26	25	------	------	------	------	------	------	------	--------

Bureau of Agricultural Economics. Compiled from the Chicago Daily Trade Bulletin. Data for 1899–1908 available in 1924 Yearbook, p. 628, Table 94.

[1] Average of daily prices weighted by car-lot sales.

TABLE 78.—*Barley: Acreage, production, value, exports, etc., United States, 1900–1931*

Year	Acreage harvested	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Price per bushel at Chicago, year beginning August[1]	Foreign trade, including barley, flour, and malt, year beginning July[2]			
							Domestic exports	Imports	Net exports[3]	
									Total	Percentage of production
	1,000 acres	*Bushels of 48 lbs.*	*1,000 bushels*	*Cents*	*1,000 dollars*	*Cents*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*Per cent*
1900	4,545	21.1	96,041	40.5	38,896	[4] 56	6,619	175	6,445	6.7
1901	4,742	25.7	121,784	45.2	55,068	64	9,079	60	9,019	7.4
1902	5,126	29.1	149,389	45.5	67,944	56	8,745	59	8,686	5.8
1903	5,568	26.4	146,864	45.4	66,700	56	11,280	94	11,187	7.6
1904	5,912	27.4	162,105	41.6	67,427	49	11,105	84	11,021	6.8
1905	6,250	27.2	170,089	39.4	66,959	50	18,431	20	18,410	10.8
1906	6,730	28.6	192,270	41.6	80,069	61	8,616	41	8,632	4.5
1907	6,941	24.5	170,008	66.3	112,675	84	4,554	202	4,370	2.6
1908	7,294	25.3	184,857	55.2	102,037	67	6,729	4	6,725	3.6
1909	*7,699*	*22.5*	*173,344*							
1909	7,699	24.4	187,973	54.8	102,947	67	4,454	5	4,449	2.4
1910	7,743	22.5	173,832	57.8	100,426	92	9,507	187	9,320	5.4
1911	7,627	21.0	160,240	86.9	139,182	122	1,655	2,772	[5] 1,117	.7
1912	7,530	29.7	223,824	50.5	112,957	68	17,874	15	17,859	8.0
1913	7,499	23.8	178,189	53.7	95,731	65	6,945	351	6,594	3.7
1914	7,565	25.8	194,953	54.3	105,903	72	28,712	103	28,609	14.7
1915	7,148	32.0	228,851	51.6	118,172	69	30,821	37	30,783	13.5
1916	7,757	23.5	182,309	88.1	160,646	191	20,319	462	19,857	10.9
1917	8,933	23.7	211,759	113.7	240,758	146	28,717	517	28,200	13.3
1918	9,740	26.3	256,225	91.7	234,942	104	29,324	24	29,301	11.4
1919	*6,473*	*18.9*	*122,025*							
1919	6,579	19.9	131,088	121.5	159,258	145	34,691	335	34,356	26.2
1920	7,438	23.1	171,533	71.6	122,746	78	27,255	20	27,234	15.9
1921	7,073	18.5	130,747	42.1	55,059	61	27,546	8	27,538	21.1
1922	6,599	23.3	153,771	52.5	80,792	65	21,909	38	21,871	14.2
1923	7,150	22.2	158,967	53.5	85,089	72	13,913	55	13,858	8.7
1924	*6,767*	*23.5*	*159,139*							
1924	6,910	24.0	165,814	74.7	123,830	90	28,543	48	28,495	17.2
1925	8,076	23.9	192,671	58.6	112,809	72	30,448	53	30,395	15.8
1926	7,840	20.9	163,712	57.1	93,510	77	19,655	49	19,605	12.0
1927	9,419	25.6	240,993	67.5	162,741	91	39,274	45	39,230	16.3
1928	12,710	26.1	331,148	54.7	180,980	60	60,295	45	60,249	18.2
1929	13,523	20.7	280,242	54.4	152,334	62	24,054	41	24,013	8.6
1930	12,662	24.1	304,601	38.9	118,359	54	11,443	1,413	10,025	3.3
1931 [6]	11,471	17.3	198,965	35.2	70,119					

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text; italic figures are census returns. See 1927 Yearbook, p. 799, for data for earlier years.

[1] From Bureau of Labor Statistics as follows: Bulletin No. 39, 1900–1901. August, 1900–December, 1901, choice to fancy malting, by samples. Wholesale price bulletins—monthly quotations, January, 1902–December, 1913, choice to fancy malting; January, 1914–September, 1927, fair to good malting. Beginning October, 1927, grade reported as feeding, but as quality remained unchanged, no change was made in comparative prices.

[2] Compiled from Commerce and Navigation of the United States, 1900–1917: Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1926; January and June issues, 1927–1931; and official records of the Bureau of Foreign and Domestic Commerce. Malt converted to terms of barley on the basis that 1.1 bushels of malt is the product of 1 bushel of barley. Barley flour converted on the basis that 1 barrel of flour is the product of 9 bushels of barley. Exports of flour not reported prior to 1919. Barley—general imports, 1900–1909; imports for consumption, 1910–1931. Malt—general imports, 1909–1914; imports for consumption, 1915–1931. Imports of flour not reported prior to 1915; imports for consumption, 1915–1931.

[3] Total exports (domestic exports plus reexports) minus total imports.

[4] Average for 11 months.

[5] Net imports. Total imports minus total exports (domestic plus foreign).

[6] Preliminary.

TABLE 79.—*Barley: Acreage harvested and production, by States, average 1924–1928, annual 1928–1931*

State and division	Acreage harvested: Average, 1924–1928	Acreage harvested: 1928	Acreage harvested: 1929	Acreage harvested: 1930	Acreage harvested: 1931 [1]	Production: Average, 1924–1928	Production: 1928	Production: 1929	Production: 1930	Production: 1931 [1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Maine	3	3	3	3	3	95	81	89	96	87
Vermont	5	5	5	5	5	141	110	130	140	150
New York	182	202	181	168	173	5,184	5,252	4,000	5,208	4,325
New Jersey	1	1	1	1	1	29	30	22	32	32
Pennsylvania	18	29	36	45	60	445	740	774	1,170	1,590
North Atlantic	210	240	226	222	242	5,893	6,213	5,015	6,646	6,184
Ohio	153	318	91	109	96	4,175	8,427	2,093	2,943	2,736
Indiana	36	78	37	38	53	766	1,599	781	950	1,293
Illinois	357	624	400	288	297	10,884	18,408	10,200	8,640	8,613
Michigan	165	264	231	238	278	4,418	7,524	4,481	6,593	7,228
Wisconsin	544	725	703	703	731	17,248	23,925	20,387	23,902	19,006
Minnesota	1,383	2,064	2,240	1,994	1,874	38,045	57,792	53,760	53,838	37,480
Iowa	367	802	685	548	521	11,415	26,466	19,865	16,166	13,546
Missouri	10	11	10	13	23	194	176	135	247	552
North Dakota	1,811	2,435	2,875	2,588	1,812	37,630	56,005	38,812	43,996	18,482
South Dakota	1,080	1,715	2,070	1,987	1,833	22,797	36,015	35,811	42,720	16,680
Nebraska	277	430	648	726	854	6,462	12,470	15,552	18,876	14,091
Kansas	425	608	582	512	563	6,171	13,072	9,603	10,496	8,726
North Central	6,607	10,074	10,572	9,744	8,935	160,205	261,879	211,480	229,367	148,433
Maryland	9	8	10	12	16	260	220	291	384	528
Virginia	12	11	13	15	17	307	314	333	342	570
North Carolina	10	16	19	21	24	178	288	342	368	480
South Atlantic	31	35	42	48	57	744	822	966	1,094	1,578
Kentucky	5	2	5	7	12	120	46	118	140	336
Tennessee	15	10	11	13	17	259	171	207	229	382
Oklahoma	119	62	71	67	117	1,826	1,023	1,136	838	2,457
Texas	167	172	194	184	221	3,112	2,924	3,783	2,760	5,194
South Central	305	246	281	271	367	5,318	4,164	5,244	3,967	8,369
Montana	160	215	258	232	139	4,303	6,450	4,128	3,828	1,946
Idaho	122	132	135	148	158	3,791	4,290	4,320	5,328	4,108
Wyoming	57	104	137	130	98	1,418	2,496	2,808	2,600	1,568
Colorado	387	512	608	572	458	7,107	11,776	10,944	12,298	7,099
New Mexico	7	8	8	9	11	114	144	150	180	253
Arizona	13	8	9	10	10	415	272	270	320	320
Utah	23	34	38	42	38	857	1,360	1,452	1,806	1,216
Nevada	7	8	5	6	5	292	280	181	240	155
Washington	65	49	54	58	59	2,042	1,666	1,620	1,827	1,888
Oregon	71	76	84	76	74	1,909	2,204	2,562	2,280	2,072
California	925	969	1,066	1,094	820	24,460	27,132	29,102	32,820	13,776
Western	1,838	2,115	2,402	2,377	1,870	46,708	58,070	57,537	63,527	34,401
United States	8,991	12,710	13,523	12,662	11,471	218,868	331,148	280,242	304,601	198,965

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

[1] Preliminary.

TABLE 80.—*Barley: Yield per acre, average 1919–1928 and annual 1926–1931, and estimated price per bushel, December 1, average 1925–1929 and annual 1926–1931, by States*

State and division	Yield per acre							Estimated price per bushel, Dec. 1						
	Average, 1919–1928	1926	1927	1928	1929	1930	1931	Average, 1925–1929	1926	1927	1928	1929	1930	1931
	Bush.	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Maine	28.6	30.0	27.0	27.0	29.7	32.0	29.0	95	92	94	110	100	81	50
Vermont	25.4	26.0	26.0	22.0	26.0	28.0	30.0	93	85	95	110	90	85	60
New York	25.9	28.3	29.0	26.0	22.1	31.0	25.0	79	75	80	78	84	62	45
New Jersey	26.4	33.0	37.0	30.0	22.0	32.0	32.0	85	85	83	86	85	65	43
Pennsylvania	22.2	24.5	24.0	25.5	21.5	26.0	26.5	85	80	83	84	90	70	49
North Atlantic	25.7	28.0	28.5	25.9	22.2	29.9	25.6	80.0	75.9	80.7	79.8	85.4	64.2	46.5
Ohio	25.1	30.0	26.0	26.5	23.0	27.0	28.5	65	62	72	60	61	50	32
Indiana	20.3	25.0	20.0	20.5	21.1	25.0	24.4	66	66	73	59	62	50	30
Illinois	29.4	31.0	29.5	29.5	25.5	30.0	29.0	61	58	73	53	56	48	39
Michigan	23.4	26.5	26.5	28.5	19.4	27.7	26.0	70	65	76	70	69	55	40
Wisconsin	28.9	31.0	31.0	33.0	29.0	34.0	26.0	67	65	75	65	65	51	43
Minnesota	24.6	22.5	28.0	28.0	24.0	27.0	20.0	53	51	65	50	48	35	34
Iowa	27.8	28.5	30.0	33.0	29.0	29.5	26.0	57	56	66	54	52	41	34
Missouri	19.6	18.0	18.5	16.0	13.5	19.0	24.0	86	80	95	80	80	60	37
North Dakota	18.4	13.5	22.5	23.0	13.5	17.0	10.2	47	46	59	43	42	26	26
South Dakota	19.6	9.0	26.0	21.0	17.3	21.5	9.1	50	52	58	48	45	29	32
Nebraska	21.6	16.5	27.5	29.0	24.0	26.0	16.5	54	58	55	51	50	35	28
Kansas	15.7	9.8	12.0	21.5	16.5	20.5	15.5	55	61	55	50	50	37	22
North Central	22.0	19.0	25.6	26.0	20.0	23.5	16.6	54.5	54.7	64.0	51.2	49.7	35.7	33.2
Maryland	27.3	30.0	26.5	27.5	29.1	32.0	33.0	84	80	87	85	82	75	45
Virginia	25.4	29.5	24.0	28.5	25.6	22.8	33.5	91	90	87	85	96	87	45
North Carolina	[1] 18.5	20.0	18.5	18.0	18.0	17.5	20.0	116	100	110	120	128	106	70
South Atlantic	24.9	26.7	22.5	23.5	23.0	22.8	27.7	97.3	88.9	94.4	97.3	103.2	89.2	52.6
Kentucky	22.5	26.5	22.5	23.0	23.5	20.0	28.0	92	86	91	91	99	83	42
Tennessee	17.7	22.5	14.5	17.1	18.8	17.6	22.5	104	96	100	110	102	98	56
Oklahoma	15.6	20.0	11.0	16.5	16.0	12.5	21.0	65	58	65	65	63	51	26
Texas	19.3	29.0	13.5	17.0	19.5	15.0	23.5	70	53	70	73	62	55	29
South Central	17.7	25.3	13.0	16.9	18.7	14.6	22.8	70.7	57.2	71.6	72.8	64.6	57.6	29.9
Montana	22.8	24.0	33.0	30.0	16.0	16.5	14.0	64	64	60	56	68	41	42
Idaho	29.6	29.0	34.5	32.5	32.0	36.0	26.0	63	60	68	63	66	41	38
Wyoming	22.6	25.5	27.0	24.0	20.5	20.0	16.0	62	62	61	61	64	44	40
Colorado	19.4	15.5	20.0	23.0	18.0	21.5	15.5	55	55	56	54	54	40	31
New Mexico	17.6	23.0	16.0	18.0	18.7	20.0	23.0	75	65	70	75	81	62	33
Arizona	30.1	27.0	30.0	34.0	30.0	32.0	32.0	85	85	75	80	85	65	55
Utah	32.3	34.0	39.0	40.0	38.2	43.0	32.0	77	72	76	73	78	52	52
Nevada	36.0	40.0	47.0	35.0	36.2	40.0	31.0	82	85	80	80	85	65	62
Washington	31.5	32.0	39.0	34.0	30.0	31.5	32.0	72	65	77	70	78	47	42
Oregon	26.2	24.0	31.0	29.0	30.5	30.0	28.0	73	65	77	72	77	50	45
California	26.6	27.3	26.5	28.0	27.3	30.0	16.8	74	58	93	72	70	48	49
Western	25.7	24.9	27.2	27.5	24.0	26.7	18.4	68.2	59.6	77.8	65.5	67.1	45.6	42.6
United States	22.8	20.9	25.6	26.1	20.7	24.1	17.3	58.5	57.1	67.5	54.7	54.4	38.9	35.2

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

[1] 5-year average.

TABLE 81.—*Barley: World production, 1894–95 to 1931–32*

Crop year	Estimated world production, excluding Russia	Estimated European production, excluding Russia	Selected countries: United States	Russia [1]	Germany	Japan	Canada	India	Spain	Rumania
	1,000,000 bushels	*1,000,000 bushels*	*1,000,000 bushels*	*1,000,000 bushels*	*1,000,000 bushels*	*1,000,000 bushels*	*1,000,000 bushels*	*1,000,000 bushels*	*1,000,000 bushels*	*1,000,000 bushels*
1894–95	935	544	78	197	131	81			57	17
1895–96	1,008	527	115	226	128	80			47	22
1896–97	973	528	99	254	125	71			36	32
1897–98	907	481	103	239	118	73			46	21
1898–99	1,040	564	100	307	130	83			73	30
1899–1900	1,017	533	117	227	137	77			54	5
1900–01	1,269	522	96	237	138	82			57	15
1901–02	1,085	570	122	240	153	83			80	24
1902–03	1,127	592	149	338	142	74			81	25
1903–04	1,099	589	147	357	153	60			64	30
1904–05	1,068	512	162	346	135	81			54	12
1905–06	1,067	532	170	347	134	77			46	26
1906–07	1,226	610	192	331	143	84			90	34
1907–08	1,161	569	170	377	161	90			54	20
1908–09	1,132	536	185	402	141	87	47		70	13
1909–10	1,338	621	188	502	161	87	55		79	20
1910–11	1,242	560	174	488	133	82	29		76	29
1911–12	1,326	606	160	437	145	86	44		87	26
1912–13	1,345	589	224	496	160	91	49		60	21
1913–14	1,400	637	178	600	169	101	48		69	27
1914–15	1,213	546	195	[2] 433	144	86	36	125	72	26
1915–16	1,244	477	229	[3] 429	114	95	54	143	84	29
1916–17	1,201	507	182	[4] 305	128	89	43	148	87	30
1917–18	1,170	427	212	325	[5] 86	89	55	156	78	
1918–19	1,277	424	256		94	[6] 89	77	156	90	[5] 5
1919–20	1,120	483	148		75	95	56	130	82	32
1920–21	1,251	554	189	216	82	92	63	150	90	68
1921–22	1,240	555	155	118	89	88	60	117	89	44
1922–23	1,306	588	182	176	74	87	72	146	78	94
1923–24	1,416	649	198	196	108	71	77	145	112	61
1924–25	1,311	566	182	181	110	75	89	137	84	31
1925–26	1,486	672	214	269	119	91	87	123	99	47
1926–27	1,456	674	185	246	113	88	100	121	96	77
1927–28	1,484	659	266	203	126	82	97	119	92	58
1928–29	1,699	743	357	256	154	81	136	98	82	69
1929–30	1,747	827	280	325	146	80	102	118	97	126
1930–31	1,687	762	305		131	72	135	107	104	109
1931–32 [7]	1,455	696	199		139	77	67		91	65

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930–31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

[1] Includes all Russian territory reporting for the years shown.
[2] Total Russian Empire exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.
[3] Exclusive of Russian Poland, Lithuania, parts of present Latvia and the Ukraine, and two Provinces of Transcaucasia.
[4] Beginning this year, estimates within present boundaries of the Union of Socialist Soviet Republics excluding Turkestan, Transcaucasia, and the Far East, which regions in 1924–25 produced 20,897,000 bushels.
[5] Postwar boundaries beginning this year and therefore not comparable with earlier years.
[6] Beginning this year weighed bushels, those reported for the earlier years being measured bushels.
[7] Preliminary.

TABLE 82.—*Barley: Acreage, yield per acre, and production in specified countries, average 1921–22 to 1925–26, annual 1928–29 to 1931–32*

Country	Acreage					Yield per acre					Production				
	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32[1]	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32[1]	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32[1]
NORTHERN HEMISPHERE	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
North America:															
Canada	3,022	4,881	5,926	5,559	3,768	25.4	27.9	17.3	24.3	17.9	76,899	136,391	102,313	135,160	67,383
United States	7,498	12,598	13,523	12,662	11,471	24.8	28.4	20.7	24.1	17.3	186,029	357,487	280,242	304,601	198,965
Estimated North American total	11,200	17,900	19,800	18,600	15,700						267,000	499,000	385,000	443,000	271,000
Europe:															
England and Wales	1,352	1,185	1,120	1,020	1,029	34.2	40.1	41.6	33.7	35.0	46,274	47,546	46,552	34,377	36,029
Scotland	158	112	101	107	88	38.6	42.9	46.7	41.4	39.2	6,092	4,807	4,713	4,433	3,453
Irish Free State	156	129	118	116	116	38.3	47.6	50.5	47.6		5,981	6,146	5,960	5,517	
Norway	137	149	132	134	138	32.0	34.4	34.3	36.7	34.1	4,383	5,133	4,533	4,922	4,703
Sweden	409	282	308	326	313	31.6	34.0	36.9	33.8	32.1	12,921	9,591	11,372	11,021	10,059
Denmark	695	877	917	928	887	46.4	57.6	55.7	52.0	50.2	32,246	50,541	51,093	48,271	44,551
Netherlands	63	70	78	76	70	52.4	64.2	64.2	52.9	52.5	3,302	4,494	5,010	4,017	3,674
Belgium	84	77	63	84	70	49.1	56.7	45.0	45.5	48.5	4,127	4,364	2,834	3,825	3,396
France	1,713	1,756	1,946	1,835	1,959	25.6	29.0	30.6	24.7	28.0	43,892	50,856	59,504	45,335	54,805
Spain	4,343	4,449	4,489	4,543	4,644	21.2	18.4	21.7	22.9	19.5	92,268	81,740	97,339	103,922	90,727
Portugal	182	178	174	171	148	11.3	8.0	11.3	13.8		2,053	1,430	1,958	2,367	
Italy	567	560	579	583	530	17.9	19.7	20.8	19.2	20.8	10,132	11,024	12,071	11,202	11,020
Germany	3,198	3,753	3,835	3,753	4,001	31.3	41.0	38.1	35.0	34.6	100,182	153,721	146,089	131,369	138,622
Austria	320	386	391	430	422	22.1	33.6	31.6	28.6	25.3	7,072	12,951	12,375	12,278	10,665
Czechoslovakia	1,670	1,820	1,836	1,673	1,759	30.0	36.3	34.9	33.4	25.8	50,119	66,020	64,072	55,932	45,444
Hungary	1,096	1,020	1,178	1,131	1,186	20.3	30.1	26.6	24.4	18.0	22,198	30,671	31,352	27,605	21,352
Yugoslavia	902	943	1,055	1,134	1,119	15.6	19.2	17.9	16.4	16.1	14,027	18,105	18,917	18,562	18,000
Greece	383	499	357	529		14.8	14.5	13.3	15.4		5,676	7,246	4,755	8,172	9,172
Bulgaria	539	605	542	692	607	17.2	25.8	17.3	28.7	27.3	9,266	15,621	9,381	19,868	16,560
Rumania	4,315	4,322	5,074	4,881	4,742	12.8	16.1	24.8	22.3	13.7	55,295	69,401	125,867	108,912	64,944
Poland	2,547	2,857	3,110	3,048	3,128	19.6	24.6	24.5	22.1	21.6	49,850	70,143	76,233	67,236	67,516
Lithuania	451	418	529	529	474	20.5	16.5	23.2	20.6	23.5	9,234	6,910	12,284	10,883	11,133
Latvia	414	362	452	437	453	16.9	9.0	21.1	19.7	20.4	6,979	3,275	9,548	8,605	9,232
Estonia	303	263	281	276	279	18.0	16.0	20.2	21.4	20.2	5,464	4,211	5,687	5,893	5,636
Finland	273	272	284	272	276	21.2	21.2	22.7	22.9	23.3	5,782	5,767	6,459	6,223	6,430
Russia, European and Asiatic	14,793	18,135	19,908	18,417	17,070	12.7	14.1	16.3			187,970	256,198	324,793		
Total Europe reporting area and production all years	25,549	26,538	28,300	27,892	28,174	23.1	27.4	28.7	26.7	24.1	591,105	726,892	813,285	744,691	677,951
Estimated European total excluding Russia	26,300	27,400	29,000	28,700	29,000						606,000	743,000	827,000	762,000	696,000

Africa:															
Morocco	2,862	2,904	3,240	3,207	3,156	14.1	16.6	14.6	11.7	16.3	40,304	48,230	47,316	37,490	51,341
Algeria	3,017	3,411	3,536	3,674	3,199	10.2	11.6	11.4	10.4	9.7	30,779	39,716	40,445	38,182	31,003
Tunis	1,033	1,459	1,248	1,202	1,087	6.6	8.7	9.2	4.6	7.6	6,843	12,631	11,482	5,512	8,268
Egypt	381	366	401	345	306	30.0	29.5	31.6	30.4	31.7	11,427	10,798	12,669	10,505	9,693
Estimated African total	8,100	8,400	9,000	8,900	8,200						101,000	117,000	120,000	98,000	107,000
Asia:															
Turkey	[2] 2,146	3,662	3,185	3,418		[3] 29.5	11.3	24.2	20.4		[3] 57,482	41,319	77,083	69,848	
India	7,501	7,858	9,155	8,601		17.8	12.4	12.8	12.4		133,793	97,720	117,600	106,867	
Syria and Lebanon	[4] 796	924	796	870	941	[4] 9.5	14.9	30.7	26.2	15.1	7,300	13,769	24,406	22,769	14,193
Japan	2,630	2,242	2,195	2,115	2,105	31.4	36.3	36.6	34.3	36.4	82,490	81,477	80,374	72,470	76,522
Chosen	2,131	2,209	2,295	2,382	2,410	17.2	15.5	16.4	16.7	17.4	36,607	34,157	37,612	39,847	41,861
Estimated Asiatic total	17,100	19,600	20,400	20,200	17,800						347,000	298,000	368,000	343,000	333,000
Total Northern Hemisphere countries reporting area and production all years	48,919	57,532	61,460	59,908	56,617	21.9	25.4	23.6	23.6	20.8	1,069,783	1,461,548	1,450,144	1,411,227	1,177,180
Estimated Northern Hemisphere total excluding Russia and China	62,700	73,300	78,200	76,400	70,700						1,321,000	1,657,000	1,700,000	1,646,000	1,407,000
SOUTHERN HEMISPHERE															
Chile	162	194	152	166	106	33.0	31.5	30.2	23.3		5,347	6,116	4,589	3,876	
Argentina	504	911	802	921	[5] 1,439	19.7	18.5	20.1	15.2	[6] 13.1	9,924	16,814	16,131	14,000	18,831
Union of South Africa	97	74	91	70		12.3	18.6	23.0	14.9		1,189	1,376	2,097	1,046	
Australia	307	355	451			19.7	19.4	17.5			6,048	6,893	7,905		
Estimated Southern Hemisphere total	1,500	2,300	2,100	2,100	2,600						31,000	42,000	47,000	41,000	48,000
Total Northern and Southern Hemisphere countries reporting area and production all years	49,423	58,443	62,262	60,829	58,056	21.8	25.3	23.6	23.4	20.6	1,079,707	1,478,362	1,466,275	1,425,227	1,196,011
Estimated world total excluding Russia and China	64,200	75,600	80,300	78,500	73,300						1,352,000	1,699,000	1,747,000	1,687,000	1,455,000

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

[1] Preliminary. [2] 2-year average. [3] 1 year only. [4] 4-year average. Acreage sown. [6] Yield per acre sown.

TABLE 83.—*Barley: Monthly marketings by farmers as reported by about 3,500 mills and elevators, United States, 1921–22 to 1930–31*

Crop year	Percentage of year's receipts												
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Season
1921–22	14.0	10.5	7.8	4.4	4.2	3.9	4.3	4.2	3.0	4.4	4.3	35.0	100.0
1922–23	22.9	14.6	10.8	5.2	6.0	4.8	3.2	3.5	1.9	2.7	7.0	17.4	100.0
1923–24	23.7	15.1	9.9	7.8	6.5	4.1	3.5	3.1	2.6	2.3	11.1	10.3	100.0
1924–25	16.8	21.4	17.0	8.1	5.7	5.1	3.8	3.3	2.4	2.7	4.7	9.0	100.0
1925–26	19.1	18.4	11.7	6.6	5.1	4.0	3.4	3.1	2.0	3.3	6.9	16.4	100.0
1926–27	16.5	11.6	7.4	6.2	4.8	5.1	3.2	3.9	3.6	4.1	16.2	17.4	100.0
1927–28	17.4	18.7	12.2	8.0	5.7	4.7	4.5	4.5	2.1	2.7	10.4	9.1	100.0
1928–29	21.4	18.3	11.8	6.7	6.0	3.5	3.9	3.2	2.7	2.5	7.4	12.6	100.0
1929–30	24.7	14.0	8.9	5.6	5.1	3.3	3.2	3.1	2.6	3.2	9.9	16.4	100.0
1930–31	25.0	15.7	10.0	5.8	5.0	4.6	3.5	3.2	3.2	3.4	13.9	6.7	100.0

Bureau of Agricultural Economics.

TABLE 84.—*Barley: Receipts at specified markets, 1921–22 to 1930–31*

Year beginning August	Minneapolis	Duluth	Chicago	Milwaukee	Omaha	Total 5 markets	Fort William and Port Arthur [1]
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1921–22	11,926	5,179	7,573	9,330	1,152	35,160	11,597
1922–23	14,244	3,844	10,103	8,922	801	37,914	15,756
1923–24	15,396	3,654	9,755	9,077	948	38,830	15,910
1924–25	23,158	14,501	11,336	13,127	796	62,918	28,045
1925–26	23,245	13,244	9,540	10,673	729	57,431	36,662
1926–27	12,086	6,667	8,386	8,440	594	36,173	35,784
1927–28	22,982	22,630	11,320	11,061	1,768	69,761	23,652
1928–29	27,174	32,764	16,680	13,554	2,259	92,431	45,498
1929–30	18,039	11,084	6,601	13,121	1,656	50,501	18,761
1930–31 [2]	18,080	6,165	6,562	10,883	1,038	42,828	16,141

Bureau of Agricultural Economics. Compiled from reports of Minneapolis Chamber of Commerce, Duluth Board of Trade, Chicago Board of Trade, Milwaukee Chamber of Commerce, Omaha Grain Exchange, American Elevator and Grain Trade, and Canadian Grain Statistics.

[1] Crop year begins September.
[2] Preliminary.

TABLE 85.—*Barley: Classification of receipts graded by licensed inspectors, all inspection points, total of all classes under each grade, 1926–27 to 1930–31*

Year beginning July	Grade											
	Choice No. 1	No. 1	Choice No. 2	Special No. 2	No. 2	Choice No. 3	No. 3	No. 4	No. 5	No. 1 feed	Sample	Total
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
1926–27 [1]	251	481	107	2,168	2,005	421	4,929	4,026	266	916	15,063	30,633
1927–28	262	2,199	90	14,913	12,151	274	16,299	6,197	183	2,875	10,923	66,336
1928–29	329	966	100	13,128	20,900	392	25,264	20,129	135	6,502	11,021	98,866
1929–30	223	700	50	9,966	5,800	315	13,907	7,269	102	3,602	5,124	47,058
1930–31	261	1,483	76	11,629	7,067	249	12,489	6,305	127	2,034	1,927	43,647

Bureau of Agricultural Economics.

[1] Barley grades became effective Aug. 24, 1926.

TABLE 86.—*Barley: Commercial stocks in store, 1926–27 to 1931–32*

DOMESTIC BARLEY IN UNITED STATES [1]

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1926–27						7,097	6,664	6,116	5,339	3,675	3,046	2,720
1927–28	3,108	5,041	6,549	5,957	5,769	4,825	4,423	4,273	4,588	3,890	2,410	2,801
1928–29	3,395	9,318	10,681	11,067	11,744	10,926	11,985	11,399	9,998	8,412	7,373	6,861
1929–30	9,798	12,894	12,563	12,721	11,760	12,074	10,961	10,415	9,726	8,137	6,843	6,366
1930–31	6,746	10,945	15,856	15,018	14,637	13,987	14,261	12,279	10,159	7,319	6,232	6,716
1931–32	6,568	7,093	7,211	7,355	7,124							

UNITED STATES BARLEY IN CANADA

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1926–27						272	300	64	70	59	0	13
1927–28	5	66	665	344	152	40	42	9	25	9	1	20
1928–29	0	767	4,171	5,599	2,319	1,144	312	173	170	81	92	659
1929–30	279	246	1,266	1,749	955	972	937	938	936	993	963	937
1930–31	797	652	580	444	371	338	309	291	272	243	68	45
1931–32	45	24	24	24	24							

CANADIAN BARLEY IN UNITED STATES [2]

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1926–27						2,942	2,246	1,677	608	2,401	1,573	175
1927–28	19	27	27	717	1,768	1,945	1,499	1,191	557	112	483	278
1928–29	300	249	1,751	2,959	4,778	6,210	4,731	3,232	2,259	2,523	3,315	2,110
1929–30	2,277	1,711	1,654	1,999	2,637	3,086	3,006	2,928	2,781	2,715	2,376	2,376
1930–31	1,839	1,300	725	832	1,561	1,329	1,274	1,267	903	764	627	353
1931–32	119	3	4	4	649							

Bureau of Agricultural Economics. Compiled from weekly reports to the grain, hay, and feed market news service. Data are for stocks on the Saturday nearest the 1st day of the month.

[1] Includes barley in store in public and private elevators in 42 important markets and also barley afloat in vessels or barges in harbors of lake and seaboard ports. Barley in transit either by rail or water, mill stocks, or small private stocks of barley intended only for local purposes, not included.
[2] Includes barley stored at lake and seaboard ports, exclusive of barley in transit on lakes and canals.

TABLE 87.—*Barley: Estimated average price per bushel received by producers, United States, 1922–23 to 1931–32*

Crop year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	47.7	46.2	49.2	52.0	55.6	56.8	56.2	58.0	59.6	60.8	58.3	54.7	51.8
1923–24	52.2	51.9	54.7	55.2	57.6	56.5	58.0	60.0	61.0	60.0	61.9	68.8	56.6
1924–25	75.7	75.6	81.4	79.7	76.2	82.4	84.8	81.5	76.1	75.9	76.4	73.5	77.4
1925–26	67.1	60.8	57.6	58.0	58.4	59.5	56.3	54.6	54.8	55.1	53.7	55.3	59.2
1926–27	55.0	52.9	54.4	56.0	56.4	58.0	61.3	62.2	64.1	68.4	76.3	71.4	61.9
1927–28	69.0	69.5	66.8	66.8	71.5	73.6	75.4	79.4	81.3	84.5	81.7	77.6	72.7
1928–29	58.9	54.1	55.2	54.5	55.0	56.2	60.5	60.1	58.0	55.3	52.6	55.6	56.1
1929–30	55.8	55.2	54.7	53.8	54.6	53.9	52.5	51.4	51.7	50.5	47.5	40.0	51.8
1930–31	43.6	45.3	41.9	38.3	38.8	36.6	35.3	34.4	35.2	35.5	32.6	30.0	39.3
1931–32	28.9	30.9	31.6	35.5	35.7								

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on 1st of month and 1st of succeeding month, August, 1922–December, 1923.

TABLE 88.—*Barley, excluding flour and malt: International trade, average 1925–26 to 1929–30, annual 1927–28 to 1930–31*

Country	Year beginning July									
	Average 1925–26 to 1929–30		1927–28		1928–29		1929–30		1930–31 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
United States	31,869	0	36,580	0	56,996	0	21,544	0	10,390	0
Rumania [2]	30,308	0	25,560	0	17,550	0	63,522	0	70,214	0
Canada	28,724	14	25,131	3	38,668	8	6,396	17	16,603	1
Russia	[3] 19,606	0	1,414	0	--------	0	--------	0	--------	0
Argentina	9,355	[3] 6	11,598	0	8,591	--------	5,986	--------	11,612	0
Poland	7,120	90	3,084	138	7,989	102	12,476	6	6,091	2
Czechoslavakia	5,301	366	7,367	64	3,643	14	5,293	31	6,252	8
Algeria	4,701	750	6,671	166	6,663	262	5,298	305	--------	--------
Tunis	4,291	[3] 477	1,016	1,309	7,278	42	6,734	79	621	894
Chile	2,936	0	2,478	0	2,137	0	1,859	0	1,167	0
Hungary	2,611	3	2,221	5	1,280	2	4,966	2	1,231	7
British India	2,169	--------	8,289	--------	1,403	--------	46	--------	261	--------
Bulgaria	1,650	0	3,488	0	1,969	0	650	0	3,307	0
Australia	1,235	1	1,304	0	1,332	0	675	2	[2] 3,220	[2] 0
Yugoslavia [4]	790	[3] 412	1,095	375	256	485	491	375	160	306
Spain	531	379	573	1	414	319	330	18	[2] 335	[2] 0
Sweden	507	13	16	40	24	3	92	2	4	41
Egypt	311	213	674	11	718	1	138	75	5	239
Total	154,015	2,724	138,559	2,112	156,911	1,238	136,496	912	131,473	1,498
PRINCIPAL IMPORTING COUNTRIES										
Germany	642	83,542	199	85,765	409	78,441	2,000	102,528	423	35,233
United Kingdom	--------	32,134	--------	34,033	--------	31,418	--------	29,798	--------	37,968
Netherlands	790	14,460	711	10,177	1,159	17,045	1,067	16,572	1,232	30,204
Belgium	258	13,586	333	11,855	192	14,592	311	16,506	2,201	21,564
Denmark	2,891	3,494	3,291	2,294	2,884	1,630	2,738	7,522	2,569	30,974
Switzerland	0	3,306	0	2,841	0	4,252	0	3,802	1	5,770
Austria	[5] 134	3,163	315	2,849	38	2,432	23	3,800	36	4,471
France	1,044	2,830	3,108	1,538	452	5,483	693	3,230	87	15,090
Norway	0	1,382	0	1,314	0	1,102	0	1,617	0	2,293
Irish Free State	430	885	612	480	436	849	53	1,067	42	595
Greece	0	593	0	145	0	603	0	874	0	171
Cuba	0	[5] 260	0	171	0	3	0	--------	0	--------
Estonia	0	244	0	195	0	516	0	154	0	34
Italy	23	209	16	273	17	128	3	193	0	1,206
Total	6,212	160,088	8,585	153,930	5,587	158,494	6,888	187,663	6,591	185,573

Bureau of Agricultural Economics. Official sources except where otherwise noted.

[1] Preliminary.
[2] Monthly Crop Report and Agricultural Statistics.
[3] 3-year average.
[4] Calendar year.
[5] 4-year average.

TABLE 89.—*Barley, No. 2: Weighted average price* [1] *per bushel of reported cash sales, Minneapolis, 1909–10 to 1931–32*

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1909–10	45	48	49	52	57	61	60	58	54	54	53	60	54
1910–11	61	63	63	66	70	77	74	81	88	75	77	87	74
1911–12	85	94	95	98	91	105	100	95	101	99	76	60	92
1912–13	46	49	50	47	45	49	48	46	46	50	52	48	48
1913–14	58	61	56	53	50	52	50	48	47	48	47	45	51
1914–15	59	58	55	59	57	68	75	70	70	70	66	68	65
1915–16	59	48	51	56	61	70	66	65	68	70	68	69	63
1916–17	81	81	103	111	107	117	117	121	136	148	138	149	117
1917–18	131	133	128	127	149	156	188	212	182	146	123	118	149
1918–19	102	95	91	94	92	90	87	93	109	113	112	121	100
1919–20	133	127	129	133	152	152	137	151	160	174	149	116	143
1920–21	102	99	92	82	74	69	65	67	61	59	57	62	74
1921–22	58	55	50	54	47	51	56	58	61	62	56	56	55
1922–23	49	54	57	60	61	57	60	59	64	61	58	59	58
1923–24	56	58	60	61	62	62	68	70	75	70	73	76	63
1924–25	80	81	85	81	87	93	94	88	81	84	84	84	84
1925–26	72	66	65	63	65	65	62	62	63	65	64	67	67
1926–27	63	62	65	64	67	69	71	72	77	88	88	81	71
1927–28	77	72	73	77	83	84	87	90	92	93	94	85	84
1928–29	65	63	63	62	62	66	70	67	65	60	60	69	65
1929–30 [2]	62	63	59	60	60	58	57	56	57	56	50	48	59
1930–31 [2]	53	54	52	48	47	44	44	44	48	45	39	42	47
1931–32 [2]	45	50	50	51	51								

Bureau of Agricultural Economics. Compiled from Minneapolis Daily Market Record.

[1] Average of daily prices weighted by car-lot sales.
[2] Special No. 2 barley used, August, 1929, to end of table.

TABLE 90.—*Flaxseed: Acreage and production, by States, average 1924–1928, annual 1928–1931*

State	Acreage					Production				
	Average, 1924–1928	1928	1929	1930	1931 [1]	Average, 1924–1928	1928	1929	1930	1931 [1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Wisconsin	10	9	7	7	7	128	122	77	77	66
Minnesota	750	726	512	742	861	7,264	5,808	4,608	7,420	6,027
Iowa	14	19	13	20	27	160	198	117	230	216
Missouri	4	7	2	2	2	27	56	10	14	10
North Dakota	1,420	1,143	1,421	1,677	1,006	10,307	8,344	6,394	7,882	3,521
South Dakota	546	554	669	702	185	4,162	3,601	3,144	3,299	462
Nebraska	7	8	20	28	6	61	64	140	154	21
Kansas	39	25	23	37	61	256	172	126	240	336
Montana	202	183	362	481	144	1,444	1,556	1,195	1,780	331
Wyoming		1	18	36	14		7	99	144	28
United States	2,993	2,675	3,047	3,732	2,313	23,816	19,928	15,910	21,240	11,018

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.

TABLE 91.—*Flaxseed: Acreage, production, value, foreign trade, net supply, etc., United States, 1909–1931*

Year	Acreage	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Price per bushel of No. 1 Flaxseed at Minneapolis, year beginning Sept. 1[1]	Flaxseed, including linseed oil, in terms of seed, year beginning Sept. 1[2] Imports	Exports, domestic and foreign	Net imports	Net supply
	1,000 acres	*Bushels of 56 lbs.*	*1,000 bushels*	*Cents*	*1,000 dollars*	*Cents*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1909	*2,083*	*9.4*	*19,513*							
1909	2,083	9.5	19,699	152.8	30,093	206	6,074	152	5,922	25,621
1910	2,467	5.2	12,718	231.7	29,472	249	12,010	73	11,937	24,655
1911	2,757	7.0	19,370	182.1	35,272	214	7,848	126	7,722	27,092
1912	2,851	9.8	28,073	114.7	32,202	138	3,845	897	2,948	31,021
1913	2,291	7.8	17,853	119.9	21,399	152	9,772	216	9,556	27,409
1914	1,645	8.4	13,749	126.0	17,318	170	12,729	571	12,158	25,907
1915	1,387	10.1	14,030	174.0	24,410	204	14,441	313	14,128	28,158
1916	1,474	9.7	14,296	248.6	35,541	291	10,946	507	10,439	24,735
1917	1,984	4.6	9,164	296.6	27,182	378	14,042	467	13,575	22,739
1918	1,910	7.0	13,369	340.1	45,470	419	9,230	482	8,748	22,117
1919	*1,261*	*5.3*	*6,653*							
1919	1,503	4.8	7,178	438.5	31,475	452	26,483	467	26,016	33,194
1920	1,757	6.1	10,752	176.7	18,999	209	16,174	219	15,955	26,707
1921	1,108	7.2	8,029	145.1	11,648	219	23,389	149	23,240	31,269
1922	1,113	9.3	10,375	211.5	21,941	258	29,009	161	28,848	39,223
1923	2,014	8.5	17,060	210.7	35,951	244	19,557	145	19,412	36,472
1924	*3,435*	*8.2*	*28,246*							
1924	3,469	9.1	31,547	227.4	71,728	263	12,849	124	12,725	44,272
1925	3,078	7.3	22,424	226.5	50,783	252	20,858	148	20,710	43,134
1926	2,907	6.7	19,335	194.0	37,510	224	24,155	112	24,043	43,378
1927	2,837	9.1	25,847	186.0	48,079	220	18,177	120	18,057	43,904
1928	2,675	7.4	19,928	201.2	40,098	233	23,611	106	23,505	43,433
1929	3,047	5.2	15,910	284.3	45,240	292	18,537	109	18,428	35,477
1930	3,732	5.7	21,240	139.8	29,684	165	9,940	69	9,871	33,553
1931[3]	2,313	4.8	11,018	120.2	13,243					

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board; italic figures are census returns. See 1927 Yearbook, page 809, for data for earlier years.

[1] The figures shown, 1909–1920 are averages of daily closing prices compiled from annual reports of the Minneapolis Chamber of Commerce; 1921–1928, are averages of daily prices weighted by car-lot sales, compiled from Minneapolis Daily Market Record.

[2] Compiled from Commerce and Navigation of the United States, 1909–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June, July, and August issues, 1919–1926 January, June, July and August issues, 1927–1930, and official records of the Bureau of Foreign and Domestic Commerce. 1 bushel of flaxseed weighs 56 pounds; 1 bushel of seed yields 2½ gallons of oil; and 1 gallon of oil weighs 7½ pounds.

[3] Preliminary.

TABLE 92.—*Flaxseed: Yield per acre, average 1919–1928, and annual 1926–1931, and estimated price per bushel December 1, average 1925–1929, and annual 1926–1931, by States*

State	Yield per acre: Av., 1919–1928	1926	1927	1928	1929	1930	1931	Estimated price per bushel Dec. 1: Av., 1925–1929	1926	1927	1928	1929	1930	1931
	Bus.	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Wisconsin	12.3	12.0	13.2	13.5	11.0	11.0	9.5	217	200	190	199	270	156	123
Minnesota	9.6	9.4	9.7	8.0	9.0	10.0	7.0	222	197	192	205	287	145	123
Iowa	10.4	11.6	12.0	10.4	9.0	11.5	8.0	217	195	195	198	275	155	120
Missouri	7.8	8.0	6.5	8.0	5.0	7.0	5.0	206	195	188	190	265	150	100
North Dakota	6.9	5.5	8.2	7.3	4.5	4.7	3.5	218	193	184	201	287	139	117
South Dakota	7.9	5.8	10.0	6.5	4.7	4.7	2.5	216	190	185	201	280	133	117
Nebraska	8.4	8.7	10.0	8.0	7.0	5.5	3.5	212	185	175	190	280	125	95
Kansas	6.6	6.9	5.5	6.9	5.5	6.5	5.5	201	200	185	185	234	156	120
Montana	6.0	4.2	10.2	8.5	3.3	3.7	2.3	210	185	175	192	280	131	110
Wyoming	[1] 6.9			7.0	5.5	4.0	2.0				195	275	129	115
United States	7.6	6.7	9.1	7.4	5.2	5.7	4.8	218.4	194.0	186.0	201.2	284.3	139.8	120.2

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] 8-year average.

TABLE 93.—*Flaxseed: World production, 1920–21 to 1931–32*

Year	World production, including Russia[1]	Northern hemisphere production, including Russia	European production, including Russia	Selected countries							
				Argentina[2]	Russia	United States	India	Canada	Poland	Lithuania[3]	Uruguay
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1920–21	110,811	49,638	14,894	60,006	9,204	18,029	16,760	7,998	637	1,011	966
1921–22	77,467	40,773	14,424	36,046	9,752	10,375	10,800	4,112	856	909	519
1922–23	105,430	56,921	16,813	47,577	11,043	17,060	17,440	5,008	1,816	1,108	719
1923–24	136,284	76,983	19,664	58,005	13,379	28,246	21,320	7,140	2,129	1,056	1,178
1924–25	131,221	84,460	23,982	45,084	16,960	31,547	18,520	9,695	1,872	1,332	1,542
1925–26	159,128	81,876	32,391	75,113	23,991	22,424	20,040	6,237	2,250	1,571	2,030
1926–27	153,945	71,080	28,861	80,783	20,877	19,335	16,080	5,995	2,472	1,574	1,970
1927–28	158,194	76,715	29,146	82,672	21,814	25,847	16,240	4,885	2,790	1,405	1,954
1928–29	149,063	68,607	30,530	78,377	23,690	19,928	13,920	3,614	2,413	1,000	2,030
1929–30	122,056	68,683	37,209	50,004	28,060	15,910	12,880	2,060	3,092	1,718	3,228
1930–31	155,435	79,972	37,805	70,264	29,957	21,240	15,200	5,069	2,335	1,532	5,056
1931–32				82,672		11,018	15,120	2,565	1,968	1,107	5,723

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930–31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

[1] Excludes a few minor producing countries for which no statistics are available and which do not enter into world trade. No production figures for Germany are available.
[2] Figures of area harvested are not available for all years but over a 16-year period the harvested area averaged 10 per cent below the sown area.
[3] Flax and hemp.

TABLE 94.—*Flaxseed: Monthly marketings by farmers, as reported by about 3,500 mills and elevators, United States, 1921–22 to 1930–31*

Crop year	Percentage of year's receipts												
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Season
1921–22	6.4	10.9	20.7	25.7	12.0	6.9	4.3	2.8	3.0	2.4	2.1	2.8	100.0
1922–23	2.5	13.4	27.6	23.3	11.4	5.9	4.7	3.0	2.7	2.3	1.6	1.6	100.0
1923–24	1.1	10.0	30.7	27.3	12.1	6.0	2.6	2.3	2.0	1.5	2.1	2.3	100.0
1924–25	.5	5.3	23.0	34.5	17.8	6.7	3.8	2.7	1.8	1.4	1.2	1.3	100.0
1925–26	1.1	11.1	34.3	23.5	12.4	5.6	2.7	2.0	1.8	1.5	1.9	2.1	100.0
1926–27	1.4	12.0	25.5	32.5	11.2	6.3	2.4	2.3	1.7	.9	1.7	2.1	100.0
1927–28	1.0	6.1	32.9	33.4	10.5	5.3	3.0	1.9	1.9	1.2	1.7	1.1	100.0
1928–29	1.1	7.2	31.1	35.3	11.6	5.3	2.1	1.2	1.4	1.0	1.5	1.2	100.0
1929–30	1.9	19.9	35.6	23.9	9.1	3.3	1.3	1.1	1.0	.8	1.0	1.1	100.0
1930–31	2.2	21.2	32.5	18.7	9.0	3.9	2.2	2.3	1.9	2.1	2.2	1.8	100.0

Bureau of Agricultural Economics.

TABLE 95.—*Flax: Acreage and production in specified countries, average 1921–22 to 1925–26, annual 1928–29 to 1931–32*

Country	Acreage					Seed production					Fiber production				
	Average, 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32 [1]	Average, 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32 [1]	Average, 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32 [1]
NORTHERN HEMISPHERE															
NORTH AMERICA	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Canada	769, 552	378, 081	382, 359	581, 800	627, 785	6, 438	3, 614	2, 060	5, 069	2, 565	----	----	----	----	----
United States	2, 156, 400	2, 638, 000	3, 047, 000	3, 732, 000	2, 313, 000	17, 877	19, 928	15, 910	21, 240	11, 018	----	----	----	----	----
Total North America	2, 925, 952	3, 016, 081	3, 429, 359	4, 313, 800	2, 940, 785	24, 325	23, 542	17, 970	26, 309	13, 583	----	----	----	----	----
EUROPE															
United Kingdom:															
England and Wales	7, 801	5, 543	6, 403	3, 900	3, 200	----	----	----	----	----	----	----	----	----	----
Northern Ireland	36, 267	37, 248	33, 911	28, 507	7, 440	----	----	----	----	----	12, 123	13, 117	15, 487	12, 032	----
Irish Free State	8, 288	8, 032	6, 283	3, 950	647	----	----	----	----	----	2, 662	2, 636	2, 771	1, 575	----
Sweden [2]	5, 651	855	1, 322	1, 322	----	6	2	2	----	----	685	276	208	----	----
Netherlands	27, 839	39, 158	47, 456	37, 317	16, 000	324	504	653	358	----	16, 166	30, 623	34, 000	22, 957	18, 234
Belgium	47, 290	58, 820	67, 589	56, 000	36, 000	410	492	708	417	227	40, 004	47, 496	41, 216	32, 499	19, 156
France	45, 508	83, 703	86, 460	74, 278	87, 829	363	763	593	739	----	29, 123	72, 589	56, 304	61, 017	----
Spain	[3] 3, 856	----	1, 337	2, 132	----	[3] 48	----	7	13	----	[3] 1, 278	----	617	1, 266	----
Italy	51, 700	43, 660	28, 000	27, 132	24, 470	451	314	265	223	201	5, 159	4, 676	7, 295	5, 553	5, 071
Austria	9, 055	11, 633	12, 100	8, 000	8, 000	55	44	44	34	32	7, 433	16, 416	15, 605	12, 694	10, 935
Czechoslovakia	56, 438	50, 171	47, 000	31, 000	23, 000	349	323	308	169	128	28, 397	22, 230	20, 728	12, 816	8, 344
Hungary	6, 918	7, 070	12, 469	36, 169	44, 000	48	54	99	341	----	5, 237	2, 784	7, 912	86, 913	----
Yugoslavia	33, 179	31, 100	34, 000	17, 000	17, 000	----	40	54	54	----	18, 465	15, 154	20, 533	22, 788	----
Bulgaria	635	591	722	1, 000	2, 000	3	3	4	7	19	188	136	130	239	176
Rumania	40, 021	47, 811	42, 798	43, 527	68, 560	224	241	278	392	----	[4] 10, 770	3, 978	5, 991	5, 933	----
Poland	229, 360	281, 889	289, 480	285, 423	252, 042	1, 785	2, 413	3, 092	2, 335	1, 968	87, 774	114, 640	144, 849	97, 300	66, 139
Lithuania [2]	144, 360	235, 500	213, 000	204, 000	133, 000	1, 195	1, 000	1, 718	1, 532	1, 107	62, 119	76, 290	74, 913	64, 188	51, 765
Latvia [2]	132, 076	169, 800	137, 880	128, 000	104, 000	783	411	904	733	582	46, 964	32, 275	48, 347	42, 395	33, 056
Estonia	75, 365	82, 880	79, 000	80, 000	45, 000	387	229	420	499	251	22, 187	17, 195	21, 498	23, 745	13, 008
Finland [5]	14, 761	13, 578	12, 000	14, 000	10, 000	----	----	----	----	----	3, 239	3, 549	3, 527	3, 527	----
Russia, incl. Asiatic	2, 799, 900	4, 288, 668	5, 074, 446	5, 551, 102	7, 735, 000	15, 025	23, 690	28, 060	29, 957	----	644, 969	716, 936	816, 804	944, 904	----
Total European countries reporting all years, including Asiatic Russia	3, 766, 761	5, 496, 855	6, 230, 997	6, 630, 305	8, 617, 188	5, 418	4, 292	6, 769	2, 199	4, 515	316, 391	361, 977	408, 581	314, 386	215, 884

NORTH AFRICA															
Kenya	7,154	284	-------	-------	-------	19	-------	-------	-------	-------	1,090	-------	-------	-------	-------
Morocco	40,844	42,600	42,239	58,046	67,000	363	437	400	448	734	-------	-------	-------	-------	-------
Algeria	643	494	494	494	-------	7	-------	3	8	-------	[4] 441	-------	-------	-------	-------
Tunis	5,996	6,946	5,752	5,411	-------	30	51	47	-------	-------	-------	-------	-------	-------	-------
Egypt	3,181	2,657	4,249	2,659	-------	31	34	53	34	-------	2,090	1,433	2,792	1,702	-------
ASIA															
India	3,216,200	3,311,000	3,109,000	2,802,000	3,020,000	17,624	13,920	12,880	15,200	15,120	-------	-------	-------	-------	-------
Japanese Empire:															
Japan	49,911	19,081	25,950	-------	-------	304	93	121	-------	-------	61,242	29,532	38,905	-------	-------
Chosen	3,386	3,987	3,815	-------	-------	-------	-------	-------	-------	-------	1,141	1,147	1,052	-------	-------
Total Northern Hemisphere countries reporting all years	9,949,757	11,866,536	12,811,595	13,804,151	14,644,973	47,730	42,191	38,019	44,156	33,952	316,391	361,977	408,581	314,386	215,884
Estimated Northern Hemisphere total	10,030,000	11,904,000	12,856,000	13,848,000	-------	64,159	69,544	69,377	83,722	-------	1,110,900	1,227,900	1,383,000	1,498,000	-------
SOUTHERN HEMISPHERE															
Chile	913	-------	793	-------	-------	16	-------	-------	-------	-------	[3] 734	-------	-------	-------	-------
Uruguay	116,279	192,234	290,676	401,851	606,000	1,198	2,030	3,228	5,056	5,723	-------	-------	-------	-------	-------
Argentina [6]	5,224,757	6,568,000	5,231,000	7,262,000	8,640,000	52,365	78,377	50,004	70,264	82,672	-------	-------	-------	-------	-------
Australia	394	299	865	-------	-------	[3] 4	2	-------	-------	-------	[7] 33	-------	-------	-------	-------
New Zealand	8,693	2,800	7,756	-------	-------	121	46	141	-------	-------	-------	-------	-------	-------	-------
Total Southern Hemisphere countries reporting all years	5,341,036	6,760,234	5,521,676	7,663,851	9,246,000	53,563	80,407	53,232	75,320	88,395	-------	-------	-------	-------	-------
Total Northern and Southern Hemisphere countries reporting all years	15,290,793	18,626,770	18,333,271	21,468,000	23,890,973	101,293	122,598	91,251	119,476	122,347	316,391	361,977	408,581	314,386	215,884
Estimated world total [8]	15,381,000	18,670,000	18,400,000	21,522,000	-------	117,863	150,000	122,750	159,185	-------	1,111,700	1,228,700	1,384,000	1,499,000	-------

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvest of the Northern Hemisphere are combined with those of the Southern Hemisphere which immediately follow; thus for 1930–31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

1 Preliminary.
2 Flax and hemp.
3 4-year average.
4 2-year average.
5 Where changes in territory have occurred averages are estimates for territory within present boundary.
6 Acreage figures are for area sown; figures of area harvested are not available for all years, but over a 16-year period the havrested area averaged 10 per cent below the sown area.
7 3-year average.
8 Excludes a few minor producing countries for which no statistics are available and which do not enter into world trade. No figures are included for Germany, whose acreage has decreased from 118,000 acres in 1921–22 to 16,000 acres in 1931–32. No production figures are available.

TABLE 96.—*Flaxseed: Receipts at Minneapolis, 1909–10 to 1931–32*

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Total
	1,000 bush.	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*
1909–10	999	2, 219	1, 892	601	966	670	826	437	222	159	123	137	9, 251
1910–11	854	1, 530	1, 292	535	338	300	232	112	118	122	133	191	5, 757
1911–12	563	1, 212	1, 570	1, 716	531	459	397	468	571	440	487	160	8, 574
1912–13	700	1, 657	1, 520	2, 245	1, 450	1, 246	1, 057	742	518	514	432	281	12, 362
1913–14	756	1, 686	1, 505	1, 131	711	478	592	270	139	165	233	117	7, 783
1914–15	901	1, 890	1, 247	1, 016	599	443	384	142	77	146	239	115	7, 199
1915–16	347	1, 038	1, 506	1, 113	319	399	810	486	440	363	441	199	7, 461
1916–17	316	2, 380	1, 694	1, 045	544	442	441	384	263	565	325	92	8, 491
1917–18	265	980	1, 112	614	533	553	527	283	349	648	208	94	6, 166
1918–19	536	915	857	788	558	473	829	439	436	942	642	196	7, 611
1919–20	753	570	568	492	344	368	409	159	295	522	554	297	5, 331
1920–21	580	1, 444	861	699	298	269	364	434	578	572	338	289	6, 726
1921–22	500	1, 144	375	354	308	200	254	196	300	220	157	288	4, 296
1922–23	909	1, 121	580	577	447	249	319	476	401	481	359	1, 019	6, 938
1923–24	2, 654	1, 953	1, 308	877	358	250	229	210	296	296	264	269	8, 964
1924–25	2, 265	3, 475	2, 781	1, 375	1, 244	750	671	374	402	442	286	1, 094	15, 159
1925–26	3, 331	2, 745	1, 107	722	375	276	320	357	431	360	294	830	11, 148
1926–27	1, 539	2, 905	1, 103	669	415	318	273	169	257	277	145	441	8, 511
1927–28	4, 465	3, 894	1, 065	490	716	495	471	311	439	457	143	652	13, 598
1928–29	3, 454	3, 690	1, 278	601	373	328	328	255	244	330	180	1, 249	12, 310
1929–30	2, 939	1, 759	624	403	180	116	133	142	390	313	162	2, 436	9, 597
1930–31	2, 295	1, 213	912	472	401	368	449	359	355	511	154	2, 110	9, 599
1931–32	1, 476	840	321	264	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from annual reports of the Minneapolis Chamber of Commerce.

TABLE 97.—*Flaxseed: Commercial stocks in store, 1926–27 to 1931–32*

DOMESTIC FLAXSEED IN UNITED STATES [1]

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1926–27	------	------	------	------	2, 684	2, 328	2, 089	2, 014	1, 834	1, 396	1, 445	909
1927–28	584	1, 583	5, 353	4, 703	4, 247	3, 542	2, 816	2, 178	1, 691	882	781	615
1928–29	317	704	2, 721	1, 343	1, 397	1, 142	780	681	547	398	434	370
1929–30	159	924	1, 179	610	917	867	740	696	589	519	433	314
1930–31	467	1, 903	2, 202	1, 431	1, 371	1, 357	1, 273	1, 205	972	784	786	672
1931–32	745	1, 383	1, 920	1, 585	------	------	------	------	------	------	------	------

CANADIAN FLAXSEED IN UNITED STATES [2]

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
1926–27	------	------	------	------	14	14	17	17	17	57	11	13
1927–28	0	0	1	12	17	18	18	0	0	0	0	1
1928–29	1	1	0	0	0	0	0	0	0	0	0	0
1929–30	0	0	0	0	0	0	0	0	0	0	0	0
1930–31	0	0	0	1	1	1	1	1	1	1	1	0
1931–32	0	0	0	0	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from weekly reports to the grain, hay, and feed market news service. Data are for stocks on the Saturday nearest the 1st day of the month.

[1] Includes flaxseed in store in public and private elevators in 42 important markets and also the flaxseed afloat in vessels or barges in the harbors of lake and seaboard ports. Flaxseed in transit either by rail or water, mill stocks, or small private stocks of flaxseed intended only for local purposes, not included.

[2] Includes flaxseed stored at lake and seaboard ports, exclusive of flaxseed in transit on lakes and canals.

Table 98.—*Flaxseed: International trade, average 1925–1929, annual, 1927–1930*

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Argentina	63,699	0	74,585	0	76,547	0	63,677	0	46,047	0
British India	9,442	763	8,670	968	6,835	633	10,005	876	10,455	736
Canada	2,828	568	2,185	354	2,950	300	850	1,374	1,397	809
Uruguay	2,079	0	2,274	0	2,379	0	2,178	0	-------	0
Lithuania	811	0	985	0	275	0	971	0	792	0
Latvia	644	560	577	512	379	706	604	682	423	300
Morocco	363	0	476	0	379	0	359	0	-------	0
Eritrea [2]	188	0	178	0	107	0	20	0	-------	0
China	117	0	221	0	10	0	1	0	23	0
Estonia	86	30	73	24	12	76	113	42	99	3
Rumania	[3] 60	[4] 0	107	0	[2] 6	-------	-------	-------	-------	-------
Tunis	46	0	46	0	64	0	39	0	25	0
Total	80,363	1,921	90,377	1,858	89,943	1,715	78,817	2,974	59,261	1,848
PRINCIPAL IMPORTING COUNTRIES										
United States	0	20,540	0	21,821	0	17,579	0	24,243	0	12,662
Netherlands	208	13,640	148	14,372	164	16,481	264	14,196	260	10,029
Germany	80	13,602	67	15,715	67	17,439	148	12,439	47	9,274
United Kingdom	0	13,439	0	14,105	0	13,884	0	11,359	0	8,935
France	20	7,368	18	7,081	15	8,272	29	8,434	27	7,659
Belgium	301	4,051	219	3,937	326	5,008	373	4,492	121	2,991
Italy	1	2,380	0	2,878	0	2,588	2	2,324	0	2,096
Sweden	0	1,477	0	1,467	0	1,652	0	1,384	0	1,425
Australia [2]	0	957	0	825	0	797	0	1,498	-------	-------
Czechoslovakia	10	885	2	930	7	956	19	1,112	33	796
Denmark	0	696	0	557	0	857	0	576	0	643
Spain	3	663	14	523	0	918	0	748	0	749
Norway	0	602	0	572	0	648	0	578	0	637
Poland	275	522	61	552	317	851	573	818	54	267
Japan	1	464	0	363	0	681	2	626	0	224
Finland	0	222	0	197	0	241	0	314	0	141
Hungary	27	92	12	101	25	118	78	126	256	188
Austria	0	15	0	13	0	14	0	17	1	16
Total	926	81,615	541	86,009	921	88,984	1,488	85,284	799	58,762

Bureau of Agricultural Economics. Official sources except where otherwise noted.

[1] Preliminary.
[2] International Yearbook of Agricultural Statistics.
[3] 4-year average.
[4] 3-year average.

Table 99.—*Flaxseed: Estimated average price per bushel received by producers, United States, 1922–23 to 1931–32*

Crop year	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	189.1	199.4	211.0	217.8	229.9	245.4	261.6	279.5	273.1	248.4	228.8	210.4	209.5
1923–24	208.4	212.1	211.4	218.8	218.8	224.9	223.7	217.7	222.6	213.1	218.1	210.2	212.3
1924–25	201.2	210.8	222.7	235.8	271.8	275.3	267.8	244.7	251.8	246.8	227.6	229.5	220.7
1925–26	227.9	228.9	228.1	232.1	224.5	216.4	202.9	207.0	205.4	203.9	208.7	215.7	224.6
1926–27	211.3	197.5	195.5	196.4	193.0	195.7	195.1	196.1	205.7	204.7	198.4	203.7	205.8
1927–28	197.1	191.2	184.2	185.3	188.4	189.9	194.8	198.4	210.5	209.0	195.5	181.7	192.0
1928–29	181.6	198.1	198.1	205.4	211.1	218.4	219.2	216.4	214.7	217.0	233.2	259.5	206.7
1929–30	285.4	300.5	285.1	287.7	279.8	275.0	261.5	263.7	245.9	245.6	192.7	191.9	266.4
1930–31	168.1	152.2	133.6	137.6	131.7	126.2	130.4	128.6	129.9	120.1	132.6	120.4	146.8
1931–32	113.1	106.5	121.9	118.7	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices on 1st of month and 1st of succeeding month September, 1922–December, 1923.

TABLE 100.—*Flaxseed, No. 1: Average price per bushel, Minneapolis, 1899–1900 to 1931–32*

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1899–1900					145	155	159	168	175	175	163	135	
1900–01	149	170	171	162	165	160	154	168	175	175	185	160	166
1901–02	150	145	142	147	165	170	172	175	175	174	152	142	159
1902–03	131	120	118	119	119	115	112	110	114	107	97	97	113
1903–04	100	98	94	97	106	115	114	112	106	107	119	124	108
1904–05	122	114	116	123	123	127	139	139	142	147	147	142	132
1905–06	104	97	98	104	116	114	113	115	114	111	110	111	109
1906–07	110	111	117	119	120	122	119	116	123	125	118	114	118
1907–08	122	127	113	112	117	116	116	117	123	123	121	129	120
1908–09	123	122	138	145	156	164	164	165	172	177	159	142	152
1909–10	141	157	175	193	218	218	225	238	222	204	234	247	206
1910–11	266	262	261	242	260	268	260	256	247	224	210	234	249
1911–12	247	235	204	206	215	206	206	215	223	225	197	186	214
1912–13	176	160	135	125	129	134	126	129	130	131	138	147	138
1913–14	145	138	135	144	149	153	158	154	156	159	168	164	152
1914–15	151	133	145	154	183	186	191	193	195	176	167	167	170
1915–16	170	186	199	207	231	232	227	213	196	180	196	215	204
1916–17	211	254	278	284	289	281	290	318	333	311	301	346	291
1917–18	338	316	329	340	360	374	408	409	393	386	440	439	378
1918–19	409	359	377	354	341	345	375	388	412	486	594	587	419
1919–20	492	432	483	499	512	509	502	468	453	392	348	328	452
1920–21	323	283	227	206	196	182	178	158	184	186	189	201	209
1921–22	203	181	181	189	213	246	257	270	280	250	259	229	219
1922–23	228	238	248	262	280	304	307	340	294	280	270	234	258
1923–24	238	248	242	246	250	258	249	247	246	244	247	244	244
1924–25	226	240	258	284	315	312	297	279	280	268	249	254	263
1925–26	259	258	256	261	250	243	232	234	230	233	244	238	252
1926–27	233	221	222	224	223	225	222	224	234	225	223	222	224
1927–28	221	213	213	215	224	227	233	236	246	238	221	205	220
1928–29	209	228	235	239	245	255	249	245	245	248	276	279	233
1929–30	323	332	324	322	308	305	292	292	268	271	232	200	292
1930–31	190	180	165	161	157	156	158	157	155	148	164	141	165
1931–32	137	132	146	143									

Bureau of Agricultural Economics. The figures shown for 1899–1920 are averages of daily closing prices compiled from annual reports of the Minneapolis Chamber of Commerce; 1921 to date are averages of daily prices weighted by car-lot sales, compiled from Minneapolis Daily Market Record.

TABLE 101.—*Linseed oil: Flaxseed crushed and quantity of oil produced, United States, 1919–20 to 1930–31*

Year beginning October	Flaxseed crushed					Oil produced				
	October-December	January-March	April-June	July-September	Total	October-December	January-March	April-June	July-September	Total
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
1919–20	7, 684	6, 336	6, 407	6, 542	26, 969	139, 960	117, 226	121, 407	126, 138	504, 731
1920–21	6, 341	6, 343	6, 332	5, 812	24, 828	120, 502	118, 787	118, 887	107, 716	465, 892
1921–22	7, 539	6, 713	3, 441	5, 583	23, 276	137, 528	124, 941	70, 239	102, 581	435, 289
1922–23	8, 602	8, 292	8, 689	8, 223	33, 806	158, 753	155, 148	178, 267	154, 588	646, 756
1923–24	8, 970	9, 575	9, 434	7, 550	35, 529	165, 560	177, 583	176, 187	139, 862	659, 192
1924–25	11, 530	12, 516	9, 128	7, 822	40, 996	211, 954	229, 544	169, 980	146, 306	757, 784
1925–26	11, 798	10, 651	7, 767	9, 500	39, 716	217, 992	194, 607	144, 950	174, 057	731, 606
1926–27	11, 085	11, 037	8, 963	9, 051	40, 136	206, 496	202, 162	167, 232	169, 274	745, 164
1927–28	12, 699	11, 885	9, 608	7, 603	41, 795	238, 046	223, 751	179, 532	141, 889	783, 218
1928–29	11, 191	10, 839	9, 962	10, 321	42, 313	206, 273	202, 353	187, 019	191, 977	787, 622
1929–30	9, 947	7, 966	7, 270	5, 887	31, 070	182, 228	145, 970	130, 863	108, 236	567, 297
1930–31 [1]	7, 391	6, 571	7, 205	7, 610	28, 777	131, 257	118, 417	130, 635	141, 205	521, 514

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census, "Animal and vegetable fats and oils."

[1] Preliminary.

Table 102.—*Linseed oil: International trade, average 1925–1929, annual 1927–1930*

Country	Calendar year									
	Average, 1925–1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Netherlands	158, 136	833	150, 621	579	155, 926	1, 187	172, 702	1, 320	172, 024	943
United Kingdom	49, 400	47, 546	44, 628	47, 815	49, 327	50, 165	44, 925	69, 418	35, 157	97, 442
Belgium	23, 497	2, 308	21, 010	760	24, 453	2, 123	29, 806	2, 944	29, 325	1, 214
Sweden	1, 267	669	1, 189	560	1, 436	580	1, 751	912	1, 435	312
Total	232, 300	51, 356	217, 448	49, 714	231, 142	54, 055	249, 184	74, 594	237, 941	99, 911
PRINCIPAL IMPORTING COUNTRIES										
Germany	8, 343	43, 213	5, 525	44, 057	10, 342	29, 188	14, 277	42, 216	9, 287	33, 931
Switzerland	27	13, 285	4	14, 234	73	14, 771	27	13, 341	49	12, 981
Brazil	0	9, 558	0	8, 666	0	10, 204	0	6, 909	0	5, 757
Austria	459	8, 996	629	8, 937	510	10, 455	363	9, 148	159	9, 101
France	4, 469	8, 195	4, 400	5, 666	4, 829	7, 033	5, 687	3, 546	12, 018	5, 954
United States	2, 350	7, 946	2, 525	946	1, 965	173	2, 208	9, 961	1, 592	2, 125
Finland	0	5, 380	0	5, 954	0	6, 507	0	4, 795	0	5, 843
Dutch East Indies	0	5, 161	0	5, 034	0	5, 505	0	5, 753	0	[2] 3, 387
Australia [3]	25	4, 968	10	4, 575	19	5, 186	18	3, 031	-------	-------
Egypt	3	4, 935	2	4, 825	1	5, 054	2	4, 686	-------	1, 154
Union of South Africa	0	4, 770	0	4, 259	0	5, 082	0	5, 014	0	4, 441
Hungary	12	4, 202	15	6, 398	1	5, 700	0	1, 263	989	1, 192
New Zealand	2	3, 789	0	2, 869	0	3, 667	0	3, 521	0	2, 892
Italy	331	3, 574	427	4, 227	165	7, 446	203	3, 455	244	2, 210
Norway	54	3, 314	17	3, 148	28	3, 191	168	4, 312	-------	1, 703
Chile	0	2, 712	0	2, 639	0	2, 533	0	3, 474	0	2, 605
British India	727	2, 092	547	1, 885	576	2, 392	1, 259	1, 874	922	1, 555
Denmark	419	2, 081	314	1, 972	1, 197	2, 379	441	2, 271	3	2, 424
British Malaya	126	1, 550	109	1, 501	116	1, 961	177	1, 579	85	1, 380
Bulgaria	0	1, 484	0	1, 382	0	1, 604	0	1, 620	0	1, 354
Yugoslavia	52	1, 390	8	1, 788	31	1, 633	4	1, 080	1	1, 028
Czechoslovakia	257	1, 369	40	1, 098	11	811	1, 155	675	514	578
China	0	1, 242	0	801	0	1, 520	0	1, 476	0	903
Philippine Islands	0	1, 210	0	1, 155	0	1, 560	0	1, 636	0	1, 621
Canada	49	819	53	738	53	734	18	1, 342	33	1, 109
Argentina	265	743	238	587	128	653	65	746	35	646
Tunis	0	668	0	629	0	792	0	733	0	912
Greece	[4] 81	419	-------	280	0	452	-------	301	-------	263
Total	18, 051	149, 065	14, 863	140, 250	20, 045	138, 186	26, 072	139, 758	25, 931	109, 052

Bureau of Agricultural Economics. Official sources except where otherwise noted. Conversions made on the basis of 7.5 pounds to the gallon.

[1] Preliminary.
[2] Java and Madura only.
[3] International Yearbook of Agricultural Statistics.
[4] 2-year average.

Table 103.—*Linseed oil, raw: Average car-lot price per gallon in barrels, New York, 1922–23 to 1931–32*

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	88	89	88	89	89	95	102	116	115	112	104	97	99
1923–24	90	94	92	92	92	91	93	90	94	94	98	102	94
1924–25	102	102	108	110	117	116	111	104	105	106	98	102	107
1925–26	103	[1] 99	96	95	87	85	80	81	81	84	89	90	89
1926–27	83	81	81	80	79	78	77	81	84	84	80	80	81
1927–28	77	74	73	72	74	74	74	74	78	77	75	73	75
1928–29	74	76	77	75	75	76	76	76	77	79	92	96	79
1929–30	116	118	111	110	105	105	105	106	105	105	104	97	107
1930–31	78	74	70	68	66	69	71	68	66	64	68	63	69
1931–32	57	55	56	53	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from Oil, Paint, and Drug Reporter, average of weekly ranges. Data for 1910–11 to 1921–22 are available in the 1930 Yearbook, p. 666, Table 103.

[1] Beginning October, 1925, prices are quoted on pound basis and have been converted to price per gallon by multiplying by 7.5.

TABLE 104.—*Linseed meal: Average wholesale price per ton, Minneapolis, 1922–23 to 1931–32*

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	43.32	50.46	53.65	54.88	57.62	55.23	49.19	47.00	45.81	41.88	43.84	49.28	49.35
1923–24	52.21	52.78	50.92	49.76	49.31	45.74	45.10	43.20	42.58	44.44	47.16	48.73	47.66
1924–25	48.08	50.00	48.86	50.58	51.31	49.91	45.08	43.68	45.96	47.63	47.98	49.08	48.18
1925–26	47.78	46.96	47.35	48.72	50.09	52.70	50.37	52.44	53.60	50.69	50.86	49.54	50.09
1926–27	47.83	46.56	46.11	46.91	47.76	48.12	51.31	51.82	50.84	49.12	48.00	48.72	48.59
1927–28	49.50	48.46	48.00	48.00	50.92	52.00	53.30	54.06	57.44	55.33	52.82	49.17	51.58
1928–29	49.75	57.33	59.00	61.43	60.85	63.29	61.29	58.52	58.99	55.39	56.31	56.31	58.20
1929–30	59.57	60.00	59.31	58.66	57.66	55.80	54.01	58.56	52.41	48.48	46.44	45.69	54.72
1930–31	45.75	43.83	42.45	42.06	40.12	38.50	34.98	34.07	31.41	27.96	29.08	29.77	36.66
1931–32	28.49	28.56	33.92	34.40	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from the Minneapolis Daily Market Record. Prices are simple averages of daily quotations. Data for 1909–10 to 1921–22 are available in the 1930 Yearbook, p. 667, Table 104.

TABLE 105.—*Rice, rough: Acreage, production, value, exports, etc., United States, 1909–1931*

Year	Acreage	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Foreign trade, mostly cleaned rice, but including rice bran, meal, and broken rice, reduced to rough basis, year beginning July[1]			
						Domestic exports	Shipments from United States to Alaska, Hawaii, and Porto Rico	Imports	Net balances[2]
	1,000 acres	*Bushels of 45 lbs.*	*1,000 bushels*	*Cents*	*1,000 dollars*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1909	*610*	*35.8*	*21,839*	------	------	------	------	------	------
1909	610	33.8	20,607	79.5	16,392	964	4,276	8,114	−2,581
1910	723	33.9	24,510	67.8	16,624	1,082	4,606	7,516	−1,605
1911	696	32.9	22,934	79.7	18,274	1,420	4,890	6,842	−157
1912	723	34.7	25,054	93.5	23,423	1,401	4,806	7,996	−1,332
1913	827	31.1	25,744	85.8	22,090	807	5,244	10,447	−3,756
1914	694	34.1	23,649	92.4	21,849	2,789	4,640	9,979	−419
1915	803	36.1	28,947	90.6	26,212	4,391	5,191	9,516	+2,651
1916	869	47.0	40,861	88.9	36,311	6,529	5,818	7,778	+6,167
1917	981	35.4	34,739	189.6	65,879	7,069	4,878	16,418	−1,148
1918	1,119	34.5	38,606	191.8	74,042	6,953	5,995	13,094	+7,638
1919	*911*	*38.8*	*35,331*	------	------	------	------	------	------
1919	1,063	39.5	41,985	266.6	111,913	17,402	5,547	6,477	+19,948
1920	1,336	39.0	52,066	119.1	62,036	15,871	6,614	3,485	+21,217
1921	921	40.8	37,612	95.2	35,802	19,494	7,179	2,650	+25,952
1922	1,055	39.2	41,405	93.1	38,562	13,344	8,290	2,503	+20,308
1923	895	37.7	33,717	110.2	37,150	8,199	9,094	1,376	+16,416
1924	*744*	*39.7*	*29,526*	------	------	------	------	------	------
1924	850	37.9	32,206	138.6	44,644	4,033	8,152	2,076	+10,687
1925	883	37.7	33,249	153.8	51,142	1,734	8,049	4,747	+5,535
1926	1,034	41.1	42,477	109.6	46,544	10,957	8,743	2,558	+17,587
1927	1,003	44.6	44,754	92.9	41,598	11,152	9,183	1,588	+19,035
1928	956	45.4	43,440	88.5	38,456	14,137	10,131	1,325	+23,403
1929	860	47.2	40,604	100.2	40,666	10,423	10,342	1,124	+19,795
1930	959	46.2	44,299	78.2	34,631	10,116	11,864	1,278	+20,829
1931[3]	970	46.4	45,014	60.9	27,402	------	------	------	------

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board; italic figures are census returns. See 1927 Yearbook, p. 819, for data for earlier years.

[1] Compiled from Commerce and Navigation of the United States, 1909–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1926; January and June issues, 1927–1931, and official records of the Bureau of Foreign and Domestic Commerce.

[2] The difference between the total exports (domestic exports plus reexports plus shipments to Alaska, Hawaii, and Porto Rico) and total imports. Net exports indicated by +; net imports indicated by −.

[3] Preliminary.

TABLE 106.—*Rice, rough: Acreage and production, by States, average 1924–1928, annual 1928–1931*

State and division	Acreage					Production				
	Average, 1924–1928	1928	1929	1930	1931 [1]	Average, 1924–1928	1928	1929	1930	1931 [1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Arkansas	175	164	156	172	177	8,097	7,823	7,956	8,170	9,381
Louisiana	472	487	465	491	471	16,944	18,896	18,832	19,149	17,192
Texas	160	163	144	186	197	6,952	8,150	7,603	9,709	10,441
United States, except California	807	814	765	849	845	31,993	34,869	34,391	37,028	37,014
California	127	132	95	110	125	6,856	8,171	6,213	7,271	8,000
United States	934	946	860	959	970	38,850	43,040	40,604	44,299	45,014

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.

TABLE 107.—*Rice, in terms of clean rice: World production, 1909–10 to 1931–32*

Crop year	Estimated world production, exclusive of China	Production in selected countries [1]							
		India	Japan	Indo-China	Java and Madura [2]	Siam [3]	Chosen	Philippines	United States
	Million pounds	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*
1909–10	107,000	63,869	16,474	--------	5,723	3,734	2,343	1,164	572
1910–11	106,000	64,552	14,650	--------	5,738	3,466	3,269	1,267	681
1911–12	109,000	63,943	16,246	--------	6,170	4,533	3,634	717	637
1912–13	109,000	63,802	15,778	6,614	5,842	4,561	3,413	1,512	696
1913–14	113,000	64,555	15,789	8,051	6,440	4,994	3,804	1,404	715
1914–15	113,000	61,109	17,909	9,521	6,339	4,708	4,439	1,100	657
1915–16	124,000	73,315	17,569	7,921	6,451	4,786	4,036	1,289	804
1916–17	129,000	78,521	18,363	6,733	6,409	5,011	4,377	1,745	1,135
1917–18	132,000	80,559	17,143	6,313	6,742	5,133	4,261	2,210	965
1918–19	105,000	54,466	17,184	6,302	6,831	4,642	4,765	2,085	1,072
1919–20	123,000	71,734	19,107	6,532	7,435	3,114	3,974	2,243	1,166
1920–21	117,000	61,949	19,857	6,284	6,250	5,868	4,639	2,560	1,446
1921–22	127,000	74,240	17,335	7,931	5,625	5,806	4,500	2,681	1,045
1922–23	133,000	75,495	19,067	7,629	6,864	5,954	4,717	2,703	1,150
1923–24	118,000	63,164	17,418	7,206	6,832	6,034	4,767	2,566	937
1924–25	127,000	69,601	17,960	7,801	7,077	6,779	4,153	2,818	895
1925–26	127,000	68,851	18,756	7,951	6,677	5,752	4,641	2,949	924
1926–27	126,000	66,483	17,465	8,255	7,108	7,169	4,807	3,083	1,180
1927–28	127,000	63,244	19,510	8,850	7,272	6,261	5,435	3,082	1,243
1928–29	130,000	72,005	18,945	7,811	7,006	5,325	4,245	3,073	1,207
1929–30 [4]	127,000	69,733	18,709	8,095	6,853	5,315	4,304	3,184	1,128
1930–31 [4]	134,000	70,771	20,516	7,990	7,221	6,620	6,026	2,928	1,231
1931–32 [4]	--------	--------	17,346	--------	7,540	--------	4,999	--------	1,250

Bureau of Agricultural Economics. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus, for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931. Estimates of world rice production for the period 1900–1901 to 1909–10 appear in Agriculture Yearbook, 1924, p. 653.

[1] China is an important producing country, but official statistics are not available.
[2] Irrigated rice.
[3] Estimated figures obtained by multiplying acreage under rice as classified for revenue purposes up to 1912–13, and acreage as reported by the Department of Land and Agriculture from 1912–13 on by an average yield for the years 1920–21 to 1923–24, for which years official estimates have been published of acreage, yield, and total production.
[4] Preliminary.

TABLE 108.—*Rice: Acreage, yield per acre, and production in specified countries, average 1921–22 to 1925–26, annual 1928–29 to 1931–32*

Country	Acreage					Yield per acre					Production, in terms of cleaned rice				
	Average, 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32[1]	Average, 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32[1]	Average, 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32[1]
NORTHERN HEMISPHERE	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*
United States	921	956	860	959	970	1,075	1,263	1,312	1,284	1,289	990	1,207	1,128	1,231	1,250
Mexico	[2] 95	112	87	90	-----	[2] 811	1,009	1,057	1,133	-----	[2] 77	113	92	102	-----
Hawaii	[3] 3	3	-----	-----	-----	-----	-----	-----	-----	-----	[3] 18	10	-----	-----	-----
Central America, South America, and West Indies:															
Guatemala	6	3	5	-----	-----	-----	-----	-----	-----	-----	3	2	3	-----	-----
Salvador	[2] 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	[2] 17	-----	15	-----	-----
Costa Rica	[4] 18	16	14	-----	-----	[4] 278	125	-----	-----	-----	[4] 5	2	-----	-----	-----
Colombia	[4] 42	46	-----	-----	-----	[4] 500	478	-----	-----	-----	[4] 21	22	-----	-----	-----
British Guiana	45	56	63	60	-----	1,156	1,446	1,460	1,417	-----	52	81	92	85	-----
Dutch Guiana	-----	40	-----	-----	-----	-----	600	-----	-----	-----	14	24	32	28	-----
Trinidad and Tobago	[2] 8	7	9	9	-----	-----	-----	-----	-----	-----	[2] 3	4	3	3	-----
Europe:															
Spain	115	121	119	120	113	3,270	3,289	3,471	3,542	3,204	376	398	413	425	362
Portugal	18	32	34	36	37	1,222	844	912	944	-----	22	27	31	34	-----
Italy	316	333	339	361	346	2,307	2,580	2,705	2,452	2,483	729	859	917	885	859
Yugoslavia	4	4	4	4	-----	-----	-----	-----	-----	-----	3	3	3	3	-----
Bulgaria	11	18	22	17	14	-----	1,278	1,273	1,412	-----	14	23	28	24	19
French West Africa:															
French Guinea	[4] 2,008	1,977	-----	-----	-----	[4] 551	551	-----	-----	-----	[4] 1,106	1,089	-----	-----	-----
French Senegal	119	111	77	74	-----	546	532	597	595	-----	65	59	46	44	-----
Upper Volta	[2] 44	-----	13	-----	-----	[2] 136	-----	-----	-----	-----	[2] 6	3	4	6	-----
Sierra Leone	390	297	297	297	-----	797	1,185	1,185	1,256	-----	311	352	352	373	-----
Egypt	192	264	327	359	-----	1,536	1,731	1,722	1,699	-----	295	457	563	610	-----
Asia:															
India	81,400	83,273	80,479	81,986	81,209	863	865	866	863	-----	70,270	72,005	69,733	70,771	-----
Andaman and Nicobar	3	4	4	-----	-----	-----	-----	-----	-----	-----	3	2	4	-----	-----
British North Borneo	62	77	79	59	-----	677	597	430	-----	-----	42	46	34	-----	-----
Brunei	[2] 3	5	7	-----	-----	-----	-----	-----	-----	-----	[2] 2	2	2	-----	-----
French establishments in India	45	47	48	-----	-----	644	574	729	-----	-----	29	27	35	-----	-----
Japanese Empire—															
Japan	7,705	7,822	7,848	7,940	-----	2,350	2,422	2,384	2,584	-----	18,107	18,945	18,709	20,516	17,346
Chosen (Korea)	3,824	3,720	4,000	4,073	4,100	1,191	1,141	1,076	1,479	1,219	4,556	4,245	4,304	6,026	4,999
Taiwan (Formosa)	1,262	1,447	1,403	1,518	-----	1,384	1,475	1,451	1,525	-----	1,747	2,135	2,036	2,315	-----
Kwantung	3	2	2	2	-----	-----	-----	-----	-----	-----	3	3	4	5	-----
French Indo-China	11,949	13,722	13,889	14,343	-----	645	569	583	557	-----	7,704	7,811	8,095	7,990	-----
Siam	5,964	5,895	6,041	7,189	-----	1,017	903	880	921	-----	6,065	5,325	5,315	6,620	-----
Federated Malay States	197	175	170	-----	-----	629	606	735	-----	-----	124	106	125	-----	-----

Unfederated Malay States	407	438	416	-------	-------	698	548	425	-------	-------	284	240	177	-------	-------
Straits Settlements	72	76	65	-------	-------	1,042	1,039	892	-------	-------	75	79	58	-------	-------
Philippine Islands	4,229	4,387	4,479	-------	-------	649	700	711	-------	-------	2,744	3,073	3,184	2,928	-------
Ceylon	799	834	838	-------	-------	589	639	763	-------	-------	471	533	639	-------	-------
SOUTHERN HEMISPHERE															
Brazil	[5] 1,029	2,718	-------	-------	-------	[5] 1,004	530	-------	-------	-------	[5] 1,033	1,440	1,302	-------	-------
Argentina	16	7	8	12	-------	1,188	-------	-------	-------	-------	19	9	8	-------	-------
Belgian Congo	27	160	143	-------	-------	222	606	622	-------	-------	6	97	89	-------	-------
Madagascar	[5] 1,298	1,273	1,383	-------	-------	1,018	773	605	-------	-------	[5] 1,322	984	837	-------	-------
Java and Madura:															
Irrigated	7,135	7,543	7,384	7,617	-------	927	929	928	948	-------	6,615	7,006	6,853	7,221	-------
Nonirrigated	879	1,173	1,077	1,188	-------	501	564	552	578	-------	440	662	595	687	-------
Total, Java and Madura	8,014	8,716	8,461	8,805	-------	880	880	880	898	-------	7,055	7,668	7,448	7,908	-------
Fiji Islands	11	12	12	-------	-------	-------	-------	-------	-------	-------	10	13	18	-------	-------
Total, countries reporting acreage and production, all periods	5,187	5,148	5,340	5,530	5,543	1,285	1,308	1,272	1,554	1,351	6,665	6,732	6,790	8,591	7,489
Estimated world total exclusive of China	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	126,000	130,000	127,000	134,000	-------

Bureau of Agricultural Economics. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus, for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

Preliminary. [2] 3-year average. 1 year only. [4] 2-year average. 4-year average.

TABLE 109.—*Rice, rough: Yield per acre, average 1919–1928 and annual 1926–1931, and estimated price per bushel December 1, average 1925–1929 and annual 1926–1931, by States*

State	Yield per acre							Estimated price per bushel Dec. 1						
	Average, 1919–1928	1926	1927	1928	1929	1930	1931	Average, 1925–1929	1926	1927	1928	1929	1930	1931
	Bus.	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Ark	46.6	53.0	44.0	47.7	51.0	47.5	53.0	104	100	90	86	94	78	61
La	35.6	32.5	40.0	38.8	40.5	39.0	36.5	107	105	87	90	100	76	63
Tex	38.9	41.5	48.6	50.0	52.8	52.2	53.0	106	110	86	88	103	79	61
Calif	54.0	53.6	56.0	61.9	65.4	66.1	64.0	122	131	115	88	105	83	56
U. S.[1]	40.5	41.3	44.6	45.4	47.2	46.2	46.4	109.0	109.6	92.9	88.5	100.2	78.2	60.9

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Prior to 1929, 5 States, including Missouri.

TABLE 110.—*Rice, rough: Receipts at mills in Texas, Louisiana, Arkansas, and Tennessee, by months, 1922–23 to 1931–32*

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
	1,000 bbls.	*1,000 bbls.*	*1,000 bbls.*	*1,000 bbls.*	*1,000 bbls.*	*1,000 bbls.*	*1,000 bbls.*	*1,000 bbls.*	*1,000 bbls.*	*1,000 bbls.*	*1,000 bbls.*	*1,000 bbls.*
1922–23	340	909	1,913	1,780	1,272	952	392	396	529	137	185	104
1923–24	177	394	1,512	1,911	966	1,076	580	370	80	14	9	6
1924–25	298	949	2,182	1,905	973	448	197	43	34	11	45	8
1925–26	457	853	925	1,131	1,672	1,019	477	210	194	119	106	74
1926–27	188	1,147	1,681	1,253	1,053	818	648	621	372	396	430	147
1927–28	530	1,167	1,719	1,266	831	853	805	942	620	352	130	17
1928–29	180	1,197	2,113	1,936	947	621	592	439	429	232	191	126
1929–30	584	1,388	2,330	1,416	797	870	961	284	146	172	48	21
1930–31	508	1,084	2,063	1,257	844	1,147	864	601	566	520	323	172
1931–32	228	1,442	1,810	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from monthly reports of the Rice Millers' Association.

TABLE 111.—*Rice, Blue Rose, clean:* [1] *Average wholesale price per 100 pounds, New Orleans, 1922–23 to 1931–32*

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	4.10	4.25	3.62	3.82	4.00	4.06	3.94	3.91	4.00	3.56	3.75	3.94	3.91
1923–24	3.78	4.00	4.88	4.66	4.38	4.62	4.69	5.06	5.06	5.38	6.12	6.19	4.94
1924–25	5.88	5.69	5.12	5.50	6.10	6.30	6.50	6.38	6.34	6.50	6.81	6.88	6.17
1925–26	6.62	6.31	5.69	6.34	6.41	6.31	6.59	6.25	6.19	5.60	5.94	5.94	6.18
1926–27	4.94	5.62	4.81	4.44	4.38	4.50	4.19	4.34	4.06	4.12	4.52	4.22	4.51
1927–28	4.12	4.12	3.84	3.62	3.69	3.75	3.66	3.62	3.50	4.12	4.28	4.12	3.87
1928–29	4.12	------	3.91	3.81	3.94	4.12	3.88	3.88	3.88	3.75	3.81	3.94	------
1929–30	4.25	3.72	3.78	3.88	3.84	4.00	4.12	4.31	4.31	4.56	4.31	4.31	4.12
1930–31	4.06	4.12	3.75	3.50	3.46	------	------	------	------	------	------	------	------
1931–32	------	------	------	------	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from annual reports of the New Orleans Board of Trade.

[1] The term "clean" is equivalent to "milled."

TABLE 112.—*Rice, including flour, meal, and broken rice: International trade, average 1925–1929, annual 1927–1930*

Country	Calendar year									
	Average 1925–1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*
British India	4,888	224	5,005	148	4,024	553	4,600	194	5,862	160
Indo-China	3,435	0	3,619	0	3,885	0	2,921	0	--------	0
Siam [2]	3,101	1	3,820	0	3,289	0	2,514	0	2,210	--------
Italy	438	3	579	2	424	6	431	6	468	13
United States	252	60	310	48	379	37	386	31	259	28
Spain	115	0	117	0	131	0	86	0	125	0
Egypt	103	59	83	33	169	31	163	36	112	25
Madagascar	42	0	23	0	25	0	16	0	14	0
Total	12,374	347	13,556	231	12,326	627	11,117	267	9,050	226
PRINCIPAL IMPORTING COUNTRIES										
China	6	2,024	11	2,812	4	1,688	4	1,443	4	2,652
British Malaya	623	1,960	693	2,185	659	2,091	545	2,079	490	2,106
Dutch East Indies	51	1,303	33	1,037	30	1,289	28	1,621	[3] 23	[3] 548
Ceylon	0	1,048	0	1,051	0	1,091	[4] 0	1,100	--------	1,079
Japan	14	961	12	1,300	9	623	8	401	97	397
Germany	325	848	294	757	280	883	256	658	159	550
France	169	532	170	486	256	631	217	562	190	534
Cuba	0	461	0	436	0	514	0	453	0	443
Netherlands	224	272	203	262	187	225	211	247	216	242
United Kingdom	13	269	17	267	14	280	13	258	14	247
Philippine Islands	1	147	2	28	2	97	1	232	1	24
Argentina	0	139	0	154	0	117	0	146	0	159
Russia [4]	[5] 0	132	0	149	--------	124	--------	103	--------	--------
Mauritius	0	129	0	131	0	141	0	121	0	114
Czechoslovakia	0	112	0	120	0	116	0	107	0	98
Belgium	4	92	4	101	4	102	5	87	1	105
Austria	0	59	0	59	0	62	0	63	0	61
Dominican Republic	0	58	0	68	0	63	0	61	0	48
Yugoslavia	0	55	0	54	0	71	0	56	0	47
Greece	0	52	0	55	0	53	0	55	0	54
Chile	0	43	0	44	0	47	0	44	0	52
Canada	1	43	1	43	0	47	2	42	1	43
Australia [4]	0	40	0	46	0	21	0	45	0	--------
Brazil	14	36	37	0	2	5	15	2	84	2
Finland	0	36	0	31	0	44	0	37	0	17
Denmark	0	24	0	23	0	25	0	27	0	22
Gambia	0	18	0	18	0	26	0	20	0	--------
Barbados	0	15	0	18	0	14	0	17	0	--------
Algeria	2	13	2	18	1	13	2	10	1	11
Hungary	3	12	5	7	3	5	3	5	1	7
Total	1,453	10,933	1,484	11,760	1,451	10,508	1,310	10,102	1,282	9,662

Bureau of Agricultural Economics. Official sources except where otherwise noted. Mostly cleaned rice. Under rice is included paddy, unhulled, rough, cleaned, polished, broken, and cargo rice, in addition to rice flour and meal. Rice bran is not included. Rough rice, or paddy, where specifically reported, has been reduced to terms of cleaned rice at the ratio of 162 pounds of rough or unhulled to 100 pounds of cleaned. "Rice, other than whole or cleaned rice," in the returns of the United Kingdom is not considered paddy, since the chief sources of supply indicate that it is practically all hulled rice. Cargo rice, a mixture of hulled and unhulled, is included without being reduced to terms of cleaned. Broken rice and rice flour and meal are taken without being reduced to terms of whole cleaned rice.

[1] Preliminary.
[2] Year ending Mar. 31 of following year.
[3] Java and Madura only.
[4] International Yearbook of Agricultural Statistics.
[5] 3-year average.

TABLE 113.—*Buckwheat: Acreage, production, value, exports, etc., United States, 1919–1931*

Year	Acreage	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Foreign trade, including flour, year beginning July [1]		
						Domestic exports	Imports	Net balance [2]
	1,000 acres	*Bushels of 48 lbs.*	*1,000 bushels*	*Cents*	*1,000 dollars*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1919	*743*	*17.1*	*12,690*					
1919	743	17.3	12,327	145.9	17,984	245	160	+85
1920	714	16.7	11,924	127.3	15,153	399	336	+63
1921	638	18.5	11,777	80.9	9,532	485	113	+372
1922	728	16.2	11,776	88.2	10,385	172	286	−114
1923	692	16.9	11,662	93.2	10,870	92	322	−230
1924	*717*	*16.8*	*12,004*					
1924	737	17.0	12,508	102.4	12,806	191	546	−355
1925	742	16.9	12,540	88.6	11,116	79	88	−9
1926	683	16.2	11,079	88.1	9,764	66	86	−20
1927	758	16.8	12,766	82.9	10,583	554	74	+480
1928	672	15.0	10,069	86.7	8,727	229	79	+150
1929	627	13.9	8,692	96.9	8,426	22	171	−149
1930	573	12.2	6,962	83.5	5,814	85	426	−341
1931 [3]	502	17.7	8,875	42.4	3,765			

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text; italic figures are census returns. See 1927 Yearbook, p. 825, for data for earlier years.

[1] Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1926; January and June issues, 1927–1931 and official records of the Bureau of Foreign and Domestic Commerce. Buckwheat—imports for consumption, 1909–1924—general imports, 1925–1930; buckwheat flour imports for consumtpion 1909–1930. Buckwheat flour converted to terms of grain on the basis that 1 barrel of flour is the product of 7 bushels of grain.

[2] The difference between total exports (domestic exports plus reexports) and total imports. Net exports indicated by +; net imports indicated by −.

[3] Preliminary.

TABLE 114.—*Buckwheat: Acreage harvested and production, by States, average 1924–1928, annual 1928–1931*

State and division	Acreage harvested					Production				
	Aver., 1924–1928	1928	1929	1930	1931 [1]	Aver., 1924–1928	1928	1929	1930	1931 [1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Maine	13	11	12	10	9	297	242	246	180	158
Vermont	2	2	2	2	2	47	48	38	38	36
New York	199	171	175	186	158	3,544	2,650	2,625	2,883	2,844
New Jersey	2	1	1	1	1	39	20	18	18	21
Pennsylvania	201	176	172	167	162	3,767	2,992	2,580	1,754	3,483
North Atlantic	417	361	362	366	332	7,694	5,952	5,507	4,873	6,542
Ohio	25	25	32	24	24	444	462	480	336	480
Indiana	14	12	15	14	13	178	150	198	182	234
Illinois	5	5	5	4	4	76	70	75	48	50
Michigan	45	38	34	18	18	574	513	320	135	180
Wisconsin	24	23	20	19	11	318	288	240	209	110
Minnesota	80	88	57	51	31	911	924	570	459	264
Iowa	7	6	9	4	3	102	60	121	52	28
Missouri	1	1	1	1	1	11	9	10	11	10
North Dakota	14	21	15	15	9	186	304	111	60	54
South Dakota	18	28	22	11	6	223	336	198	77	30
Nebraska	1	1	1	1	1	11	10	9	7	8
North Central	234	248	211	162	121	3,033	3,126	2,332	1,576	1,448
Delaware	2	1	1	1	1	18	12	13	8	13
Maryland	7	7	7	7	7	147	133	129	98	154
Virginia	17	20	14	12	13	237	270	186	108	196
West Virginia	28	25	23	17	20	506	450	409	212	410
North Carolina	6	5	5	4	4	85	68	68	48	60
South Atlantic	61	58	50	41	45	992	933	805	474	833
Kentucky	4	3	2	2	2	46	30	21	14	25
Tennessee	2	2	2	2	2	27	28	27	25	27
South Central	6	5	4	4	4	73	58	48	39	52
United States	718	672	627	573	502	11,792	10,069	8,692	6,962	8,875

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

[1] Preliminary.

TABLE 115.—*Buckwheat: Yield per acre, average 1919–1928 and annual 1926–1931, and estimated price per bushel December 1, average 1925–1929, and annual 1926–1931, by States*

State and division	Yield per acre							Estimated price per bushel Dec. 1						
	Av. 1919–1928	1926	1927	1928	1929	1930	1931	Average, 1925–1929	1926	1927	1928	1929	1930	1931
	Bus.	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Maine	22.5	23.0	23.0	22.0	20.5	18.0	17.5	91	83	90	90	90	80	60
Vermont	22.0	23.0	26.0	24.0	18.8	19.0	18.0	97	85	96	105	110	85	75
New York	18.0	17.5	18.5	15.5	15.0	15.5	18.0	90	89	84	90	100	80	41
New Jersey	19.4	18.0	21.0	20.0	18.0	18.0	21.0	96	100	84	92	105	94	46
Pennsylvania	18.8	17.0	20.5	17.0	15.0	10.5	21.5	91	89	85	89	100	89	40
North Atlantic	18.5	17.5	19.7	16.5	15.2	13.3	19.7	90.4	88.8	84.8	89.6	99.6	83.3	41.1
Ohio	19.0	17.0	19.0	18.5	15.0	14.0	20.0	89	95	86	87	92	89	41
Indiana	13.4	13.0	13.5	12.5	13.2	13.0	18.0	89	95	85	85	95	89	39
Illinois	15.0	13.0	16.2	14.0	15.0	12.0	12.5	93	92	85	90	98	85	45
Michigan	13.0	13.0	11.5	13.5	9.4	7.5	10.0	83	80	80	79	85	83	44
Wisconsin	12.8	12.5	13.5	12.5	12.0	11.0	10.0	85	87	82	83	93	82	50
Minnesota	11.7	13.0	11.0	10.5	10.0	9.0	8.5	76	75	70	76	84	65	36
Iowa	14.8	18.0	13.0	10.0	13.4	13.0	9.5	88	82	85	90	95	89	60
Missouri	11.6	12.5	14.5	9.0	9.5	11.0	10.0	92	85	90	95	100	90	40
North Dakota	11.9	15.0	14.5	14.5	7.4	4.0	6.0	69	80	64	68	73	65	37
South Dakota	11.7	12.5	14.5	12.0	9.0	7.0	5.0	71	80	64	67	74	70	28
Nebraska	11.2	11.0	12.0	10.0	9.0	7.0	8.5	89	90	85	85	85	75	65
North Central	13.5	13.5	12.8	12.6	11.1	9.7	12.0	81.2	82.5	75.2	78.1	87.4	78.5	41.0
Delaware	11.5	10.0	12.5	11.5	13.0	7.5	13.0	94	90	95	95	100	95	45
Maryland	19.8	19.0	22.0	19.0	18.4	14.0	22.0	98	100	93	95	100	95	47
Virginia	13.5	15.5	14.5	13.5	13.3	9.0	15.1	98	95	93	95	99	98	55
West Virginia	18.4	18.5	20.5	18.0	17.8	12.5	20.5	101	100	97	97	110	106	56
North Carolina	13.0	15.5	14.0	13.5	13.5	12.0	15.0	103	100	100	100	107	98	58
South Atlantic	16.4	17.2	18.2	16.1	16.1	11.6	18.5	99.8	98.6	95.7	96.1	105.5	101.1	54.1
Kentucky	10.2	10.5	9.5	10.0	10.5	7.0	12.5	92	84	86	86	102	90	50
Tennessee	14.1	16.0	13.5	14.0	13.7	12.5	13.5	103	100	90	100	110	100	65
South Central	11.4	12.3	11.0	11.6	12.0	9.8	13.0	96.1	90.5	87.3	93.1	106.2	97.4	57.7
United States	16.8	16.2	16.8	15.0	13.9	12.2	17.7	88.6	88.1	82.9	86.7	96.9	83.5	42.4

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

TABLE 116.—*Buckwheat: Estimated average price per bushel received by producers, United States, 1922–23 to 1931–32*

Crop year	Sept. 15	Oct. 15	Nov 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	85.2	82.2	84.4	89.0	88.5	88.6	92.6	95.0	98.4	102.3	101.4	99.4	89.9
1923–24	96.6	94.2	93.4	94.7	92.7	92.5	94.7	93.6	97.0	96.5	104.5	123.9	96.3
1924–25	118.8	107.1	106.8	104.6	107.0	112.2	112.4	104.1	113.3	112.3	115.7	110.0	108.6
1925–26	101.2	87.6	86.7	87.9	85.7	80.9	81.7	82.5	85.0	90.1	89.9	93.7	87.5
1926–27	90.4	86.5	83.6	83.5	83.6	84.6	86.0	85.1	88.1	98.8	101.0	98.1	87.0
1927–28	92.3	82.9	79.4	81.0	82.0	85.2	90.2	94.8	102.3	109.0	108.0	98.1	87.6
1928–29	92.6	84.5	84.8	88.7	91.2	94.3	94.1	96.4	96.5	94.7	100.4	99.6	90.7
1929–30	96.6	95.8	95.6	95.9	97.3	95.8	94.9	94.8	95.7	100.0	98.3	97.4	96.3
1930–31	97.1	90.7	82.8	80.0	79.1	76.6	77.4	75.2	73.2	72.6	70.0	59.2	79.6
1931–32	52.4	40.2	41.2	41.9									

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by average monthly marketings. Mean of prices reported in 1st of month and 1st of succeeding month, September, 1922–December, 1923.

TABLE 117.—*Sorghums* [1] *for grain, forage, and all purposes: Acreage, production, value, United States, 1919–1931*

Year	For grain			For forage			For all purposes			Price per bushel received by producers Dec. 1 [2]	Farm value, basis Dec. 1 farm price
	Acreage	Yield per acre	Production	Acreage	Yield per acre	Production	Acreage	Equivalent yield per acre	Equivalent production on total acreage		
	1,000 acres	*Bus.*	*1,000 bus.*	*1,000 acres*	*Short tons*	*1,000 short tons*	*1,000 acres*	*Bus.*	*1,000 bus.*	*Cents*	*1,000 dollars*
1919	3,630	20.4	73,950	2,665	1.67	4,438	6,295	19.4	122,350	127.4	155,889
1920	4,027	21.8	87,732	2,513	1.78	4,479	6,540	20.9	136,385	93.8	127,976
1921	3,700	19.2	70,947	2,424	1.57	3,794	6,124	18.3	112,288	39.2	44,068
1922	3,369	14.7	49,523	2,127	1.37	2,917	5,496	13.7	75,530	87.3	65,942
1923	4,204	14.7	61,648	2,150	1.40	3,015	6,354	13.9	88,466	93.5	82,674
1924	3,506	16.7	58,454	2,184	1.40	3,050	5,690	15.5	87,920	85.5	75,140
1925	3,887	14.2	55,236	2,385	1.29	3,076	6,272	13.1	82,244	75.1	61,748
1926	4,211	16.8	70,869	2,229	1.32	2,950	6,440	15.8	101,502	54.2	55,007
1927	4,270	17.0	72,736	2,452	1.47	3,613	6,722	16.0	107,276	62.7	67,261
1928	4,121	17.8	73,425	2,406	1.48	3,566	6,527	17.1	111,702	61.5	68,751
1929	3,467	14.2	49,399	2,664	1.37	3,654	6,131	13.2	81,041	70.5	57,127
1930	3,449	10.8	37,203	3,137	1.20	3,750	6,586	9.8	64,416	63.6	40,949
1931 [3]	4,502	15.5	69,558	2,650	1.33	3,533	7,152	14.6	104,529	30.0	31,370

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

[1] Kafirs, milo, feterita, durra, etc. [2] From 1919 to 1924, Nov. 15 price. [3] Preliminary.

TABLE 118.—*Sorghums:* [1] *Acreage and production, by States, average 1924–1928, annual 1928–1931*

State	Acreage for all purposes					Production for all purposes [2]				
	Average, 1924–1928	1928	1929	1930	1931 [3]	Average, 1924–1928	1928	1929	1930	1931 [3]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Missouri	77	76	61	65	76	1,114	1,216	915	975	1,444
Nebraska	24	24	15	12	15	378	420	225	204	218
Kansas	1,327	1,153	959	988	1,107	20,775	20,754	14,385	10,374	17,712
Oklahoma	1,463	1,417	1,198	1,335	1,443	17,861	17,004	13,178	8,678	12,987
Texas	2,855	3,272	3,331	3,593	3,871	48,341	62,168	43,303	35,930	60,000
Colorado	234	220	175	180	191	2,235	2,530	1,838	2,340	2,101
New Mexico	240	255	293	297	356	4,463	4,590	4,571	2,435	7,832
Arizona	25	25	21	30	24	594	725	567	900	648
California	85	85	78	86	69	2,368	2,295	2,059	2,580	1,587
United States	6,330	6,527	6,131	6,586	7,152	98,129	111,702	81,041	64,416	104,529

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory report.

[1] Kafirs, milo, feterita, durra, etc. [2] Includes grain equivalent on forage acreage. [3] Preliminary.

TABLE 119.—*Sorghums:* [1] *Yield per acre, average 1919–1928 and annual 1926–1931, and estimated price per bushel December 1, average 1925–1929, and annual 1926–1931, by States*

State	Equivalent yield per acre							Estimated price per bushel Dec. 1						
	Av., 1919–1928	1926	1927	1928	1929	1930	1931	Av., 1925–1929	1926	1927	1928	1929	1930	1931
	Bush.	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Missouri	15.6	14.0	16.0	16.0	15.0	15.0	19.0	87	80	75	80	100	80	70
Nebraska	16.4	10.0	20.5	17.5	15.0	17.0	14.5	84	80	80	85	100	80	65
Kansas	16.0	12.5	17.5	18.0	15.0	10.5	16.0	64	60	60	61	70	65	30
Oklahoma	13.1	12.5	12.5	12.0	11.0	6.5	9.0	59	45	50	62	65	60	30
Texas	18.0	19.0	17.0	19.0	13.0	10.0	15.5	65	55	65	60	70	65	29
Colorado	12.2	5.0	11.0	11.5	10.5	13.0	11.0	67	60	65	60	80	50	23
New Mexico	19.7	21.0	14.0	18.0	15.6	8.2	22.0	62	40	80	60	65	45	24
Arizona	24.1	22.0	22.0	29.0	27.0	30.0	27.0	75	60	75	80	95	70	45
California	27.5	27.0	28.0	27.0	26.4	30.0	23.0	96	84	97	90	100	70	60
United States	16.4	15.8	16.0	17.1	13.2	9.8	14.6	64.8	54.2	62.7	61.5	70.5	63.6	30.0

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

[1] Kafirs, milo, feterita, durra, etc.

TABLE 120.—*Grain sorghums:*[1] *Receipts at Kansas City, by months, 1922–23 to 1931–32*

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Total
	1,000 bush.	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*
1922–23	168	444	420	233	169	139	76	50	69	35	19	18	1,840
1923–24	195	350	465	579	398	340	274	262	250	106	63	103	3,385
1924–25	647	1,152	683	636	497	320	301	440	221	183	68	24	5,172
1925–26	279	629	416	290	261	211	290	469	162	94	136	97	3,334
1926–27	307	493	626	442	293	216	192	241	249	285	79	112	3,625
1927–28	410	905	696	519	592	392	323	343	224	87	51	236	4,778
1928–29	449	675	856	525	705	426	394	668	207	196	97	182	5,380
1929–30	294	626	296	447	327	296	202	179	68	42	52	34	2,863
1930–31	299	239	162	145	130	139	109	204	41	38	31	134	1,671
1931–32	257	76	------	------	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from annual statistical reports of Kansas City Board of Trade.

[1] Includes kafir corn, milo maize, and feterita. Quoted as Kafir in Table 117, 1927 Yearbook. Receipts for 1909–10 to 1921–22 available in 1931 Yearbook, p. 670, Table 131.

TABLE 121.—*Grain sorghums: Classification of receipts graded by licensed inspectors, all inspection points, total of all classes under each grade, 1925–26 to 1930–31*

	Grade					
	No. 1	No. 2	No. 3	No. 4	Sample	Total
Year beginning July—	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
1925–26	312	4,158	5,796	1,639	495	12,400
1926–27	878	7,180	6,674	1,792	691	17,215
1927–28	1,175	9,885	8,125	3,143	965	23,293
1928–29	866	7,247	5,400	6,794	3,969	24,276
1929–30	557	5,495	4,043	3,664	1,722	15,481
1930–31	224	2,368	2,432	1,240	390	6,654

Bureau of Agricultural Economics.

TABLE 122.—*Kafir, No. 2 White: Weighted average price*[1] *per bushel of reported cash sales, Kansas City, 1921–22 to 1931–32*

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1921–22	48	50	50	72	74	67	72	77	93	96	111	102	76
1922–23	100	91	89	90	93	96	99	94	84	83	(2)	(2)	------
1923–24	(2)	71	(2)	68	67	73	62	85	94	(2)	113	89	------
1924–25	88	98	109	103	93	92	97	105	113	116	107	100	101
1925–26	82	77	77	72	68	70	69	70	79	76	74	71	73
1926–27	64	64	63	63	65	69	79	102	110	97	(2)	70	------
1927–28	69	71	74	81	88	90	92	91	92	83	89	83	82
1928–29	78	74	75	80	71	71	71	74	89	90	105	81	77
1929–30	77	73	76	72	77	91	91	94	92	101	98	(2)	------
1930–31	63	61	58	53	53	59	58	57	51	42	42	36	55
1931–32	40	33	------	------	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from Kansas City Grain Market Review, formerly Daily Price Current. Quoted per 100 pounds; converted to bushels of 56 pounds. Data for 1909–1920 available in 1930 Yearbook, Table 123.

[1] Average of daily prices weighted by car-lot sales. [2] No quotations.

STATISTICS OF COTTON, SUGAR, AND TOBACCO

TABLE 123.—*Cotton: Acreage, production, value, exports, etc., United States, 1849, 1859, 1866–1931*

Year	Acreage harvested	Average yield per acre	Production [1]	Price per pound received by producers, Dec. 1	Farm value, basis Dec. 1 farm price	Average price per pound, New York [2]	Domestic exports, year beginning Aug. [3 4 5]	Imports, year beginning Aug. [4 6]	Net exports, year beginning Aug. [3 4 5 7]
	1,000 acres	*Lbs.*	*1,000 bales*	*Cents*	*1,000 dollars*	*Cents*	*1,000 bales*	*1,000 bales*	*1,000 bales*
1849			*2,469*			12.34	[8] 1,271	[8] 1	[8] 1,270
1859			*5,387*			11.00	[8] 3,535	[8 9] 4	[8] 3,531
1866	7,599	129.0	1,750			31.59	[8] 1,323	[8] 2	[8] 1,324
1867	7,828	189.8	2,340			24.85	1,511	2	1,510
1868	6,799	192.2	2,380			29.01	1,288	[9] 6	1,281
1869			*3,012*			23.98			
1869	7,743	196.9	*3,012*			23.98	1,980	4	1,977
1870	8,885	198.9	3,800			16.95	2,894	3	2,893
1871	7,558	148.2	2,553			20.48	1,851	7	1,844
1872	8,483	188.7	3,920			18.15	2,437	11	2,426
1873	9,510	179.7	3,683			17.00	2,706	5	2,702
1874	11,764	147.5	3,941			15.00	2,523	5	2,520
1875	11,934	190.6	5,123			13.00	3,003	5	2,999
1876	11,677	167.8	4,438	9.0	174,724	11.73	2,869	6	2,864
1877	12,133	163.8	4,370			11.28	3,198	7	3,194
1878	12,344	191.2	5,244	8.2	192,515	10.83	3,265	6	3,259
1879	*14,480*	181.0	*5,755*	10.3	269,305	12.02	3,711	7	3,705
1880	15,951	184.5	6,343	9.8	289,083	11.34	4,409	9	4,403
1881	16,711	149.8	5,456			12.16	3,430	9	3,426
1882	16,277	185.7	6,957	9.1	275,513	10.63	4,582	9	4,577
1883	16,778	164.8	5,701	9.1	250,977	10.64	3,745	15	3,734
1884	17,440	153.8	5,682	9.2	246,575	10.54	3,740	10	3,733
1885	18,301	164.4	6,575	8.4	251,775	9.44	4,193	11	4,185
1886	18,455	169.5	6,446	8.1	251,856	10.25	4,274	9	4,266
1887	18,641	182.7	7,020	8.5	290,901	10.27	4,557	11	4,547
1888	19,059	180.4	6,941	8.5	292,139	10.71	4,720	17	4,704
1889	*20,175*	159.7	*7,473*	8.5	275,249	11.27	4,934	19	4,915
1890	19,512	187.0	8,674	8.6	313,360	9.48	5,859	45	5,815
1891	19,059	179.4	9,018	7.2	247,633	7.68	5,888	61	5,827
1892	15,911	209.2	6,664	8.3	277,194	8.45	4,456	90	4,367
1893	19,525	149.9	7,493	7.0	204,983	7.75	5,309	58	5,253
1894	23,688	195.3	9,476	4.6	212,335	6.38	7,010	104	6,908
1895	20,185	155.6	7,161	7.6	238,503	8.10	4,710	115	4,598
1896	23,273	184.9	8,533	6.7	286,169	7.71	6,172	119	6,055
1897	24,320	182.7	10,898	6.7	296,816	6.40	7,757	102	7,656
1898	24,967	220.6	11,189	5.7	315,449	6.00	7,662	105	7,557
1899	*24,275*		*9,345*						
1899	24,327	183.8	*9,345*	7.0	326,215	8.36	6,228	140	6,091
1900	24,933	194.4	*10,123*	9.2	463,310	9.38	6,800	109	6,692
1901	26,774	170.0	*9,510*	7.0	334,088	8.73	6,949	202	6,750
1902	27,175	187.3	*10,631*	7.6	403,718	9.96	7,084	151	6,936
1903	27,052	174.3	*9,851*	10.5	516,763	12.84	6,207	103	6,107
1904	31,215	205.9	*13,438*	9.0	603,438	9.09	8,908	129	8,781
1905	27,110	186.6	*10,575*	10.8	569,791	11.30	7,118	144	6,980
1906	31,374	202.5	*13,274*	9.6	635,534	11.24	8,943	227	8,741
1907	29,660	179.1	*11,107*	10.4	575,226	11.53	7,666	153	7,518
1908	32,444	194.9	*13,242*	8.7	575,092	10.23	8,955	181	8,778
1909	*32,044*		*10,005*						

Bureau of Agricultural Economics; italic figures are census returns; other acreage, yield, and production figures are estimates by the crop-reporting board; acreage revised on census basis.

[1] 500-pound gross weight bales, from 1899–1931.

[2] Compiled, 1849–1888, from Cotton Movement and Fluctuations, an annual, published by Latham, Alexander & Co., New York, and are averages for crop year beginning September. From New York Commercial and Financial Chronicle, 1889–1899, and from reports of New York Cotton Exchange since 1900. Since 1889 the averages are for crop year beginning August.

[3] Excluding linters from 1914 to 1920.

[4] Compiled from Commerce and Navigation of the United States, 1849–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June and July, 1919–1931, and January, 1927–1931.

[5] Bales of 500 pounds gross weight.

[6] Bales of 478 pounds net, which are equivalent to bales of 500 pounds gross weight.

[7] Total exports (domestic plus foreign) minus imports.

[8] Year beginning July 1.

[9] Estimated from value of imports. Average import price per pound calculated by assuming that the percentage change in import price from the previous year is equal to the percentage change in the export prices.

TABLE 123.—*Cotton: Acreage, production, value, exports, etc., United States, 1849, 1859, 1866–1931*—Continued

Year	Acreage harvested	Average yield per acre	Production	Price per pound received by producers, Dec. 1	Farm value, basis Dec. 1 farm price	Average price per pound, New York	Domestic exports, year beginning Aug	Imports, year beginning Aug.	Net exports, year beginning Aug.
	1,000 acres	*Lbs.*	*1,000 bales*	*Cents*	*1,000 dollars*	*Cents*	*1,000 bales*	*1,000 bales*	*1,000 bales*
1909	30, 938	154. 3	*10, 005*	13. 9	697, 681	14. 66	6, 353	170	6, 194
1910	32, 403	170. 7	*11, 609*	14. 1	820, 407	14. 87	8, 027	245	7, 787
1911	36, 045	207. 7	*15, 693*	8. 8	687, 888	10. 85	11, 116	233	10, 885
1912	34, 283	190. 9	*13, 703*	11. 9	817, 055	12. 29	9, 146	249	8, 899
1913	37, 089	182. 0	*14, 156*	12. 2	862, 708	13. 21	9, 508	273	9, 251
1914	36, 832	209. 2	*16, 135*	6. 8	549, 036	[10] 8. 89	8, 702	400	8, 322
1915	31, 412	170. 3	*11, 192*	11. 3	631, 460	11. 98	6, 113	458	5, 673
1916	34, 985	156. 6	*11, 450*	19. 6	1, 122, 295	19. 28	5, 525	311	5, 219
1917	33, 841	159. 7	*11, 302*	27. 7	1, 566, 198	29. 68	4, 402	231	4, 175
1918	36, 008	159. 6	*12, 041*	27. 6	1, 663, 633	31. 01	5, 774	211	5, 568
1919	*33, 740*		*11, 421*						
1919	33, 566	161. 5	*11, 421*	35. 6	2, 034, 558	38. 29	6, 707	732	5, 993
1920	35, 878	178. 4	*13, 440*	13. 9	933, 658	17. 89	5, 973	237	5, 753
1921	30, 509	124. 5	*7, 954*	16. 2	643, 933	18. 92	6, 348	380	5, 980
1922	33, 036	141. 2	[11] *9, 755*	23. 8	1, 160, 968	26. 24	5, 007	492	4, 536
1923	37, 123	130. 6	*10, 140*	31. 0	1, 571, 829	31. 11	5, 815	306	5, 530
1924	*39, 204*		*13, 628*						
1924	41, 360	157. 4	*13, 628*	22. 6	1, 540, 884	24. 74	8, 240	328	7, 923
1925	46, 053	167. 2	*16, 104*	18. 2	1, 464, 032	20. 53	8, 267	340	7, 939
1926	47, 087	182. 6	*17, 977*	10. 9	982, 736	15. 15	11, 299	419	10, 900
1927	40, 138	154. 5	*12, 955*	19. 6	1, 269, 885	20. 42	7, 859	354	7, 524
1928	45, 341	152. 9	*14, 478*	18. 0	1, 301, 796	19. 73	8, 419	479	7, 957
1929	45, 793	155. 0	*14, 828*	16. 4	1, 217, 829	16. 60	7, 035	395	6, 650
1930	45, 091	147. 7	*13, 932*	9. 5	659, 455	10. 38	7, 133	112	7, 029
1931 [12]	40, 495	200. 1	16, 918	5. 7	485, 611				

[10] Average for nine months only. Exchange closed August–Nov. 17, on account of war.
[11] Cotton grown in the United States. Excludes about 7,000 bales Lower California cotton ginned in the United States. Small quantities such cotton included in census ginning reports and prior years.
[12] Preliminary.

TABLE 124.—*Cotton: Acreage in cultivation and acreage abandoned, by States, averages, and annual, 1926–1931*

State	Acreage in cultivation July 1							Acreage abandoned after July 1						
	Average, 1925–1929	1926 [1]	1927 [1]	1928	1929	1930	1931 [2]	Av., 1920–1929	1926 [3]	1927 [3]	1928	1929	1930	1931
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Missouri	404	472	305	355	348	377	352	4. 8	8. 0	4. 5	6. 0	2. 0	2. 0	0. 5
Virginia	86	95	65	81	89	91	72	2. 0	2. 0	2. 0	2. 0	1. 3	2. 0	1. 0
North Carolina	1, 922	2, 015	1, 749	1, 892	1, 916	1, 656	1, 358	1. 6	1. 5	1. 2	1. 7	2. 0	0. 8	0. 7
South Carolina	2, 527	2, 716	2, 454	2, 485	2, 273	2, 191	1, 950	2. 7	2. 5	4. 0	5. 0	2. 5	0. 8	0. 5
Georgia	3, 778	4, 025	3, 501	3, 883	3, 818	3, 906	3, 471	3. 6	1. 5	2. 5	4. 0	1. 7	1. 1	0. 9
Florida	95	108	67	101	96	122	118	5. 2	3. 0	4. 0	6. 0	1. 8	2. 0	3. 0
Tennessee	1, 129	1, 178	985	1, 145	1, 147	1, 250	1, 109	2. 2	3. 0	2. 0	3. 3	1. 0	2. 0	0. 4
Alabama	3, 564	3, 699	3, 214	3, 643	3, 727	3, 789	3, 444	1. 7	1. 3	1. 5	3. 0	1. 0	0. 5	0. 7
Mississippi	3, 820	3, 809	3, 408	4, 154	4, 229	4, 290	4, 036	2. 6	1. 5	2. 0	3. 0	1. 5	1. 1	1. 2
Arkansas	3, 718	3, 867	3, 142	3, 834	3, 933	3, 996	3, 598	2. 3	2. 0	3. 0	4. 0	1. 9	2. 2	1. 0
Louisiana	1, 939	2, 019	1, 585	2, 052	2, 135	2, 142	1, 934	2. 8	2. 0	2. 7	3. 0	1. 0	1. 5	0. 7
Oklahoma	4, 688	5, 083	4, 187	4, 420	4, 430	4, 099	3, 352	6. 7	8. 0	14. 0	4. 0	3. 5	2. 5	1. 0
Texas	18, 338	19, 140	16, 850	18, 330	18, 229	17, 528	15, 656	3. 8	4. 0	4. 0	3. 2	4. 0	3. 3	1. 5
New Mexico	124	125	100	123	132	134	116	[4] 10. 6	4. 0	5. 0	5. 0	1. 5	5. 0	1. 5
Arizona	180	168	140	202	227	215	178	1. 6	0. 6	0. 7	1. 0	0. 5	0	1. 0
California	202	167	130	223	319	273	197	1. 7	3. 0	1. 5	2. 2	3. 1	1. 0	0. 8
All other	34	44	23	23	19	19	13	[4] 4. 6	2. 3	5. 0	5. 0	0	0. 5	0. 8
United States	46, 548	48, 730	41, 905	46, 946	47, 067	46, 078	40, 954	3. 5	3. 4	4. 2	3. 4	2. 7	2. 1	1. 1

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] In cultivation June 25. [2] Preliminary. [3] Abandoned after June 25. [4] 8-year average.

TABLE 125.—*Cotton: Acreage harvested, by States, 1919–1931*

State	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931[1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*
Missouri	125	136	103	198	355	493	520	434	291	334	341	369	350
Virginia	42	42	34	55	74	102	100	93	64	79	88	89	71
North Carolina	1,490	1,587	1,403	1,625	1,679	2,005	2,017	1,985	1,728	1,860	1,878	1,643	1,348
South Carolina	2,835	2,964	2,571	1,912	1,965	2,404	2,654	2,648	2,356	2,361	2,216	2,173	1,940
Georgia	5,220	4,900	4,172	3,418	3,421	3,046	3,589	3,965	3,413	3,728	3,753	3,863	3,440
Florida	103	100	65	118	147	80	101	105	64	95	94	120	114
Tennessee	758	840	634	985	1,172	996	1,173	1,143	965	1,107	1,136	1,225	1,105
Alabama	2,791	2,858	2,235	2,771	3,079	3,055	3,504	3,651	3,166	3,534	3,690	3,770	3,420
Mississippi	2,848	2,950	2,628	3,014	3,170	2,981	3,466	3,752	3,340	4,029	4,166	4,243	3,988
Arkansas	2,725	2,980	2,382	2,799	3,026	3,094	3,738	3,790	3,048	3,681	3,858	3,908	3,562
Louisiana	1,527	1,470	1,168	1,140	1,405	1,616	1,874	1,979	1,542	1,990	2,114	2,110	1,920
Oklahoma	2,424	2,749	2,206	2,915	3,197	3,861	5,214	4,676	3,601	4,243	4,275	3,997	3,318
Texas	10,476	11,898	10,745	11,874	14,150	17,175	17,608	18,374	16,176	17,743	17,500	16,950	15,421
New Mexico	-----	-----	-----	28	60	101	107	120	95	117	130	127	114
Arizona	107	230	90	101	127	180	162	167	139	200	226	215	176
California	85	150	55	67	83	130	169	162	128	218	309	270	195
All other	10	24	18	16	13	41	57	43	22	22	19	19	13
United States	33,566	35,878	30,509	33,036	37,123	41,360	46,053	47,087	40,138	45,341	45,793	45,091	40,495
Lower California (old Mexico)	100	125	85	135	150	137	150	130	110	160	147	100	69

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.

TABLE 126.—*Cotton: Production of lint in 500-pound gross-weight bales, by States, and linters, United States, 1919–1931*

State	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931[1]
	1,000 bales	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*
Missouri	64	79	70	[2] 149	[2] 127	[2] 193	[2] 299	218	115	147	220	151	270
Virginia	23	21	16	27	51	39	53	51	31	44	48	42	43
North Carolina	830	925	776	852	1,020	825	1,102	1,213	861	836	747	775	775
South Carolina	1,426	1,623	755	493	770	807	889	1,008	730	726	830	1,001	1,015
Georgia	1,660	1,415	787	715	588	[2] 1,002	1,164	1,496	1,100	1,030	1,343	1,593	1,395
Florida	16	18	11	25	12	[2] 22	38	32	[2] 17	19	29	50	43
Tennessee	310	325	302	391	[2] 226	[2] 354	[2] 515	[2] 451	[2] 359	[2] 428	[2] 515	[2] 377	605
Alabama	713	663	580	824	587	[2] 985	1,357	1,498	[2] 1,191	1,109	1,342	1,473	1,430
Mississippi	961	895	813	989	604	1,099	1,991	1,888	1,355	1,475	1,915	1,464	1,725
Arkansas	884	1,214	797	[2] 1,011	[2] 622	[2] 1,094	[2] 1,600	1,548	1,000	1,246	1,435	874	1,855
Louisiana	298	388	279	343	368	493	910	829	548	691	809	715	865
Oklahoma	1,016	1,336	481	627	656	1,511	1,691	1,773	1,037	1,205	1,143	854	1,220
Texas	3,099	4,345	2,198	3,222	[2] 4,340	[2] 4,949	[2] 4,163	[2] 5,628	[2] 4,352	[2] 5,106	[2] 3,940	[2] 4,038	5,270
New Mexico	-----	10	6	12	[2] 30	[2] 57	[2] 66	[2] 75	[2] 70	[2] 88	[2] 90	[2] 99	98
Arizona	60	103	45	47	78	108	119	[2] 122	[2] 91	[2] 149	153	155	119
California	56	75	34	21	54	77	122	131	91	172	260	264	181
All other	5	3	3	7	[2] 8	[2] 14	[2] 26	[2] 17	[2] 7	[2] 7	[2] 9	7	9
United States	11,421	13,440	7,954	9,755	10,140	13,628	16,104	17,977	12,955	14,478	14,828	13,932	16,918
Linters, total U. S.[3]	608	440	398	608	669	897	1,115	1,158	1,016	1,282	1,241	986	-----

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census.

[1] Preliminary estimate of the Department of Agriculture.
[2] Slight differences from census figures on ginnings are due to ginnings in one State of cotton grown in another.
[3] Year beginning Aug. 1.

TABLE 127.—*Cotton: Yield per acre and estimated price per pound, December 1, by States, averages, and annual, 1926–1931*

State	Yield per acre							Estimated price per pound						
	Av., 1920–1929	1926	1927	1928	1929	1930	1931	Av., 1925–1929	1926	1927	1928	1929	1930	1931
	Lbs.	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Missouri	254	240	188	210	308	195	369	15. 4	10. 0	20. 5	18. 0	16. 7	9. 5	6. 0
Virginia	246	264	230	265	258	225	289	17. 1	11. 4	20. 0	18. 2	17. 0	9. 6	5. 8
North Carolina	247	292	238	215	190	225	275	17. 0	11. 5	19. 5	18. 5	16. 7	9. 9	6. 0
South Carolina	169	182	148	147	179	220	250	17. 0	11. 7	19. 6	18. 4	16. 4	9. 9	6. 0
Georgia	136	180	154	132	171	197	194	16. 7	11. 1	19. 4	18. 2	15. 8	9. 3	5. 7
Florida	113	145	126	97	145	200	180	16. 5	10. 2	19. 1	17. 9	16. 7	8. 8	5. 5
Tennessee	184	188	178	185	217	147	262	15. 9	10. 0	19. 0	18. 0	16. 5	9. 1	5. 5
Alabama	151	196	180	150	174	187	200	16. 6	10. 7	19. 0	18. 2	16. 1	9. 0	5. 5
Mississippi	182	241	194	175	220	165	207	17. 5	11. 6	20. 5	18. 5	17. 2	10. 0	6. 4
Arkansas	169	195	157	162	178	107	249	16. 4	11. 0	20. 2	18. 2	16. 7	9. 2	6. 0
Louisiana	160	200	170	166	183	162	216	16. 6	11. 0	19. 2	17. 9	16. 6	9. 3	5. 8
Oklahoma	146	181	138	136	128	102	176	15. 9	9. 7	19. 8	17. 2	15. 7	8. 8	5. 1
Texas	132	147	129	138	108	114	164	16. 4	10. 8	19. 3	17. 5	16. 0	9. 4	5. 5
New Mexico	[1] 293	299	352	360	333	375	412	17. 9	12. 3	19. 8	19. 5	17. 7	10. 2	5. 8
Arizona	296	349	315	357	324	346	324	21. 3	13. 3	25. 6	23. 5	22. 5	11. 8	7. 9
California	306	387	340	378	402	468	444	18. 9	14. 0	21. 0	19. 5	18. 0	10. 7	6. 5
United States	154. 4	182. 6	154. 5	152. 9	155. 0	147. 7	200. 1	16. 6	10. 9	19. 6	18. 0	16. 4	9. 5	5. 7

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] 8-year average.

TABLE 128.—*Cotton: World production of lint, 1909–10 to 1931–32*

Crop year	Estimated world total excluding China	Estimated world total including China	Production in selected countries						Estimated world total commercial crop [2]
			United States	India	Egypt	China [1]	Brazil	Russia	
	1,000 bales [3]	*1,000 bales* [3]	*1,000 bales* [3]	*1,000 bales* [3]	*1,000 bales* [3]	*1,000 bales* [3]	*1,000 bales* [3]	*1,000 bales* [3]	*1,000 bales* [4]
1909–10	16, 900		10, 005	3, 998	1, 036		324		[5] 16, 241
1910–11	18, 400		11, 609	3, 254	1, 555		357		[5] 18, 027
1911–12	21, 900		15, 693	2, 730	1, 530		360		[5] 21, 269
1912–13	21, 100		13, 703	3, 702	1, 554		418		[5] 20, 976
1913–14	22, 200		14, 156	4, 239	1, 588		477		[5] 21, 618
1914–15	24, 200		16, 135	4, 359	1, 337		465	1, 270	[5] 23, 768
1915–16	17, 800		11, 192	3, 128	989		339	1, 512	[5] 17, 649
1916–17	18, 366	19, 900	11, 450	3, 759	1, 048	1, 534	337	1, 199	[5] 18, 092
1917–18	17, 608	19, 700	11, 302	3, 393	1, 304	2, 092	414	634	[3] 18, 140
1918–19	17, 841	20, 900	12, 041	3, 328	999	3, 059	406	161	[3] 18, 755
1919–20	18, 782	21, 300	11, 421	4, 853	1, 155	2, 518	461	81	[3] 20, 220
1920–21	19, 217	21, 100	13, 440	3, 013	1, 251	1, 883	476	58	[3] 19, 665
1921–22	13, 886	15, 400	7, 954	3, 753	902	1, 514	504	43	[3] 15, 334
1922–23	16, 982	19, 300	9, 755	4, 247	1, 391	2, 318	553	55	17, 926
1923–24	17, 707	19, 700	10, 140	4, 320	1, 353	1, 993	576	196	19, 036
1924–25	22, 622	24, 800	13, 628	5, 095	1, 507	2, 178	605	453	23, 836
1925–26	25, 798	27, 900	16, 104	5, 201	1, 629	2, 192	602	782	26, 678
1926–27	26, 658	28, 400	17, 977	4, 205	1, 586	1, 742	512	830	27, 819
1927–28	22, 125	24, 000	12, 955	4, 990	1, 261	1, 875	487	1, 090	23, 426
1928–29	24, 434	26, 900	14, 478	4, 838	1, 672	2, 466	525	1, 250	25, 628
1929–30	24, 384	26, 500	14, 828	4, 289	1, 768	2, 116	584	1, 310	26, 653
1930–31	24, 250	25, 600	13, 932	4, 033	1, 715	2, 250	455	1, 550	25, 304
1931–32 [6]	25, 500	27, 300	16, 918	[7] 3, 349	1, 286	1, 800	550	1, 900	

Bureau of Agricultural Economics. Compiled from official sources and International Institute of Agriculture unless otherwise stated. The crop year is from Aug. 1 to July 31. For the United States prior to 1914 the figures apply to the year beginning Sept. 1.

[1] Chinese Cotton Mill Owners' Association, except for 1930–31 and 1931–32, which are estimates of this bureau. Figures represent the crop in the most important cotton-producing Provinces where the commercial crop is grown. Most of the cotton produced in other Provinces is used for home hand-loom consumption.
[2] Figures as reported by the U. S. Bureau of the Census, including the cotton destined to enter commercial channels for factory purposes. Estimates of the commercial crop in China are included.
[3] Bales of 478 pounds net.
[4] American in running bales and foreign cotton in bales of 478 pounds net.
[5] Bales of 500 pounds net.
[6] Preliminary.
[7] Second forecast of production which includes total crop except late plantings.

TABLE 129.—*Cotton: Acreage and yield of lint per acre in specified countries; average, 1909–10 to 1913–14, 1924–25 to 1928–29; annual, 1928–29 to 1931–32*

Country	Acreage						Yield of lint per acre					
	Average, 1909–10 to 1913–14	Average, 1924–25 to 1928–29	1928–29	1929–30	1930–31	1931–32 [1]	Average, 1909–10 to 1913–14	Average, 1924–25 to 1928–29	1928–29	1929–30	1930–31	1931–32 [1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
United States	34, 152	43, 996	45, 341	45, 793	45, 091	40, 495	182	163	153	155	148	200
India	22, 503	26, 368	27, 033	25, 922	23, 616	[2] 23, 511	76	88	86	79	82	68
Egypt	1, 743	1, 817	1, 805	1, 911	2, 162	1, 747	399	404	443	443	379	352
China	-----	4, 366	4, 847	5, 133	5, 228	5, 078	-----	227	243	197	206	169
Brazil	[3] 887	1, 290	1, 273	1, 436	1, 614	-----	[3] 209	202	197	195	135	-----
Russia	1, 569	1, 695	2, 288	2, 550	3, 870	5, 281	276	248	261	246	191	172
Mexico	253	443	502	492	390	326	353	262	265	239	217	309
Chosen (Korea)	146	487	503	456	473	461	67	132	142	146	156	141
Uganda	58	594	699	663	740	876	169	115	117	71	101	109
Peru	[4] 163	301	283	314	-----	-----	-----	360	379	461	-----	-----
Anglo Egyptian Sudan	44	242	315	369	387	356	158	210	216	180	131	-----
Argentina	5	235	256	301	424	-----	214	203	247	228	-----	-----
Total above countries, including China, reporting 1928-29 to 1930-31	-----	-----	84, 882	85, 026	83, 995	-----	-----	-----	-----	-----	-----	-----
Estimated world total, including China	-----	-----	87, 400	87, 700	86, 700	81, 000	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Data for crop year as given at the head of the table are for crops harvested between Aug. 1 and July 31. This applies to both Northern and Southern Hemispheres. For the United States prior to 1914 the figures apply to the harvest year beginning Sept. 1.

[1] Preliminary.
[2] Fourth forecast, which includes total area except late plantings.
[3] Average for 3 years.
[4] Average, 1914–15 to 1918–19.

TABLE 130.—*Cotton: Estimated monthly marketings by farmers, 1921–22 to 1930–31*

Crop year	Percentage of year's sales [1]												
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Season
1921–22	3. 6	14. 0	22. 3	17. 1	12. 1	5. 9	4. 3	4. 6	4. 6	5. 9	3. 0	2. 6	100. 0
1922–23	5. 2	16. 8	25. 3	19. 8	12. 8	5. 9	4. 4	3. 7	2. 0	1. 0	1. 5	1. 6	100. 0
1923–24	4. 1	16. 3	24. 6	24. 9	13. 3	5. 8	3. 1	2. 4	1. 7	1. 3	. 9	1. 6	100. 0
1924–25	3. 3	15. 2	25. 2	22. 3	14. 5	7. 0	5. 3	3. 4	1. 6	1. 0	. 6	. 6	100. 0
1925–26	6. 5	19. 3	23. 1	17. 6	12. 0	6. 5	4. 2	3. 1	2. 3	1. 7	2. 1	1. 6	100. 0
1926–27	2. 7	15. 2	22. 0	19. 5	12. 5	6. 3	5. 8	5. 0	3. 8	3. 1	2. 5	1. 6	100. 0
1927–28	6. 6	20. 0	23. 8	17. 3	9. 7	4. 2	4. 0	4. 2	3. 1	2. 7	2. 3	2. 1	100. 0
1928–29	4. 6	15. 6	24. 8	20. 8	12. 8	5. 4	4. 0	4. 8	1. 8	1. 6	1. 9	1. 9	100. 0
1929–30	5. 7	18. 2	28. 3	20. 6	11. 8	4. 2	2. 6	2. 3	1. 4	1. 1	1. 6	2. 2	100. 0
1930–31	7. 7	19. 0	25. 6	20. 3	11. 7	3. 9	2. 8	2. 4	1. 8	1. 6	1. 8	1. 4	100. 0

Bureau of Agricultural Economics.

[1] As reported by about 7,500 cotton growers, supplemented by records of State weighers, cooperative associations, and cotton dealers.

TABLE 131.—*Cotton: Production of lint in specified countries; average, 1909–10 to 1913–14, 1924–25 to 1928–29; annual, 1927–28 to 1931–32*

Country	Year beginning August						
	Average, 1909–10 to 1913–14	Average, 1924–25 to 1928–29	1927–28	1928–29	1929–30	1930–31	1931–32 [1]
NORTH AMERICA	*Bales* [2]	*Bales* [2]	*Bales* [2]	*Bales* [2]	*Bales* [2]	*Bales* [2]	*Bales* [2]
United States [3]	13,033,000	15,028,000	12,955,000	14,478,000	14,828,000	13,932,000	16,918,000
Mexico	186,821	242,865	179,238	278,460	246,029	177,506	207,000
Total North American countries reporting 1927–28 to 1930–31			13,134,238	14,756,460	15,074,029	14,109,506	
SOUTH AND CENTRAL AMERICAS, WEST INDIES							
Venezuela		32,876	32,000	36,380			
Colombia		14,796	11,207	9,501	10,000	10,000	
Peru	106,000	226,428	245,615	224,528	302,514		
Ecuador	[4] 297	6,719	4,556	5,097	6,788	12,049	
Brazil	387,000	546,265	487,041	525,234	584,477	454,999	[5] 550,000
Paraguay	[6] 92	[7] 11,198		12,604	16,596	18,449	
Argentina	2,314	99,763	101,467	132,368	143,899		
Guatemala	[8] 75	700	12	28	46		
Haiti [4]	9,300	20,922	20,419	21,920	23,635		
Dominican Republic	[9] 1,163	422	273	76			
Porto Rico	[10] 1,319	1,478	960	1,335			
Salvador		2,739	189	217			
British West Indies	6,058	4,150	4,245	4,000	4,500	5,000	
Total South and Central American countries and West Indies reporting 1927–28 to 1930–31			507,049	543,832	605,765	482,048	
EUROPE							
Italy	5,212	[8] 4,760			3,300	4,000	1,000
Yugoslavia	922	352	190	218	585	622	
Greece	[11] [12] 12,614	14,807	12,571	14,875	15,264	10,397	
Bulgaria	842	2,459	3,457	3,214	4,180	4,477	5,000
Malta	433	460	287	453	317	245	
Spain		2,270	2,553	3,189	3,000	7,431	
Total European countries reporting 1927–28 to 1930–31			19,058	21,949	23,346	23,172	
AFRICA							
Algeria	[9] 1,370	5,120	3,401	6,288	7,668	5,161	1,000
Morocco (French)		401	369	351	369		
French West Africa:							
Dahomey	[4] 664	4,397	3,445	3,330	5,705	5,848	
Ivory Coast	[4] [8] 212	6,441	7,127	8,309	8,082	9,436	
French Guinea	[4] [10] 167	1,821	2,306	1,845			
Senegal		2,526	2,306	4,243	565	565	
French Sudan		7,539	9,409	9,501	9,501	12,637	
Upper Volta		6,795	3,599	3,816	5,876	4,441	
French Togo	[8] 2,463	7,418	7,084	9,432	8,805		
Nigeria	8,702	28,044	17,515	26,883	36,757	15,063	
French Equatorial Africa		[9] 977	692	830	3,228	6,918	4,600
Egypt	1,453,000	1,535,000	1,261,000	1,672,000	1,768,000	1,715,000	1,286,000

[1] Preliminary.
[2] Bales of 478 pounds net.
[3] Linters not included. Production of linters during this period has been: Average 1909–10 to 1913–14, 502,711 bales; 1924–25 to 1928–29, 1,093,710 bales; 1927–28, 1,016,375 bales; 1928–29, 1,282,061 bales; 1929–30, 1,241,355 bales; 1930–31, 986,430 bales.
[4] Exports.
[5] Based on an official estimate for Northern Brazil (10 States), which during the last 10 years have produced over 80 per cent of the total Brazilian crop.
[6] For season 1915–16.
[7] Average for 4 years.
[8] Average for 2 years.
[9] Average for 3 years.
[10] For 1 year only.
[11] For season 1911–12.
[12] Old boundaries.

TABLE 131.—*Cotton: Production of lint in specified countries; average, 1909–10 to 1913–14, 1924–25 to 1928–29; annual, 1927–28 to 1931–32*—Continued

Country	Year beginning August						
	Average, 1909–10 to 1913–14	Average, 1924–25 to 1928–29	1927–28	1928–29	1929–30	1930–31	1931–32
AFRICA—continued	*Bales*	*Bales*	*Bales*	*Bales*	*Bales*	*Bales*	*Bales*
Anglo-Egyptian Sudan	14, 455	106, 409	111, 822	142, 191	139, 200	106, 470	----------
Italian Somaliland	[4] 510	3, 694	3, 828	7, 034	7, 500	3, 459	4, 000
Eritrea	[4] 948	1, 965	1, 384	1, 061	1, 153	2, 000	2, 000
Gold Coast	103	[7] 404	84	196	----------	----------	----------
Belgian Congo	----------	22, 188	27, 557	30, 867	30, 831	----------	----------
Kenya	552	1, 465	[4] 1, 039	[4] 1, 660	1, 270	670	----------
Uganda	20, 338	142, 453	115, 886	170, 757	108, 051	155, 647	184, 000
Tanganyika	[4] [7] 7, 971	19, 032	13, 360	27, 576	23, 251	19, 360	11, 656
Nyasaland	4, 603	4, 448	2, 336	3, 740	5, 098	7, 806	----------
Northern Rhodesia	[9] 307	200	44	52	41	----------	----------
Southern Rhodesia	----------	1, 986	72	226	1, 130	1, 757	----------
Mozambique	[4] 388	8, 228	11, 956	12, 505	7, 192	----------	----------
Union of South Africa	76	11, 439	9, 216	8, 179	13, 486	7, 312	----------
Total African countries reporting 1927–28 to 1930–31	----------	----------	1, 567, 437	2, 097, 624	2, 145, 521	2, 079, 550	----------
ASIA							
Cyprus	1, 983	2, 455	1, 766	1, 796	2, 946	3, 999	----------
Turkey (Asiatic)	[13] 102, 116	89, 532	53, 831	113, 255	100, 433	73, 970	----------
Syria and Lebanon	----------	9, 023	9, 582	4, 312	14, 000	12, 000	17, 000
Russia [14]	904, 900	881, 000	1, 090, 000	1, 250, 000	1, 310, 000	1, 550, 000	[15] 1,900, 000
Iraq	----------	2, 601	1, 506	4, 353	3, 974	2, 625	----------
Persia [4]	[9] [16] 136, 000	78, 831	75, 007	91, 735	67, 638	----------	3, 349, 000
India	3, 585, 000	4, 866, 000	4, 990, 000	4, 838, 000	4, 289, 000	4, 033, 000	3, 349, 000
China [17]	----------	2, 072, 000	1, 875, 000	2, 466, 000	2, 116, 000	2, 250, 000	1, 800, 000
Japanese Empire:							
Japan	4, 704	1, 502	1, 100	943	724	----------	----------
Chosen (Korea)	20, 392	134, 317	133, 238	149, 878	138, 942	154, 000	136, 000
French Indo-China	[4] 13, 800	5, 577	5, 067	6, 121	8, 120	[18] 5, 782	----------
Dutch East Indies [4]	[8] 18, 242	5, 171	5, 315	4, 262	4, 061	----------	----------
Siam	[4] 3, 653	3, 470	2, 885	2, 756	3, 206	----------	----------
Total Asiatic countries reporting 1927–28 to 1930–31	----------	----------	8, 159, 990	8, 833, 715	7, 983, 415	8, 085, 376	----------
OCEANIA							
Australia	73	7, 030	7, 714	5, 036	8, 394	9, 500	----------
New Hebrides	[7] 547	2, 485	2, 582	1, 542	2, 249	----------	----------
Total Oceania reporting 1927–28 to 1930–31	----------	7, 030	7, 714	5, 036	8, 394	9, 500	----------
Total all countries reporting 1927–28 to 1930–31	----------	----------	23, 395, 486	26, 258, 616	25, 840, 470	24, 789, 152	----------
Estimated world total, including China	20, 900, 000	26, 400, 000	24, 000, 000	26, 900, 000	26, 500, 000	25, 600, 000	27, 300, 000

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture except as otherwise stated. Data for crop year as given at the head of the table are for crops harvested between Aug. 1 and July 31. For the United States prior to 1914 the figures apply to the year beginning Sept. 1.

[4] Exports.
[7] Average for 4 years.
[8] Average for 2 years.
[9] Average for 3 years.
[13] For season 1910–11.
[14] It is estimated that in 1930–31, 8.4 per cent and in 1931–32, 16.6 per cent of the total acreage was in European Russia.
[15] Estimates of Bureau of Agricultural Economics.
[16] From an unofficial source.
[17] Estimates of the Chinese Mill Owners' Association, except figures for 1930–31 and 1931–32, which are estimates of this bureau. The figures represent the crop in the most important Provinces where the commercial crop is grown.
[18] Includes Annam and Tonkin.

TABLE 132.—*Cotton: Supply and distribution, United States, 1913–14 to 1930–31*

Year beginning August	Supply					Distribution					
	Production	Carry-over from previous season		Imports	Total supply	Consumption		Exports	Stocks on hand at end of year		Total distribution [1]
		Foreign	Total			Foreign	Total		Foreign	Total	
	1,000 bales	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*
1913–14	13, 983	83	1, 511	261	15, 755	194	5, 577	8, 655	73	1, 366	15, 598
1914–15	15, 906	73	1, 366	382	17, 654	222	5, 597	8, 323	145	3, 936	17, 856
1915–16	11, 068	145	3, 936	438	15, 442	317	6, 398	5, 896	212	3, 140	15, 434
1916–17	11, 364	212	3, 140	292	14, 796	318	6, 789	5, 303	143	2, 720	14, 812
1917–18	11, 248	143	2, 720	221	14, 189	184	6, 566	4, 288	111	3, 450	14, 304
1918–19	11, 906	111	3, 450	202	15, 558	176	5, 766	5, 592	83	4, 287	15, 645
1919–20	11, 326	83	4, 287	700	16, 313	417	6, 420	6, 545	284	3, 563	16, 528
1920–21	13, 271	284	3, 563	226	17, 060	216	4, 893	5, 745	174	6, 534	17, 172
1921–22	7, 978	174	6, 534	363	14, 875	297	5, 910	6, 184	167	2, 832	14, 926
1922–23	9, 729	167	2, 832	470	13, 031	344	6, 666	4, 823	196	2, 325	13, 814
1923–24	10, 171	196	2, 325	292	12, 788	328	5, 681	5, 656	116	1, 556	12, 893
1924–25	13, 639	116	1, 556	313	15, 508	276	6, 193	8, 005	106	1, 610	15, 808
1925–26	16, 123	106	1, 610	326	18, 059	280	6, 456	8, 051	129	3, 543	18, 050
1926–27	17, 755	129	3, 543	401	21, 699	309	7, 190	10, 927	99	3, 762	21, 879
1927–28	12, 783	99	3, 762	338	16, 883	299	6, 834	6, 540	111	2, 536	16, 910
1928–29	14, 297	111	2, 536	458	17, 291	313	7, 091	8, 044	182	2, 312	17, 447
1929–30	14, 548	182	2, 312	378	17, 238	302	6, 106	6, 690	209	4, 530	17, 326
1930–31	13, 756	209	4, 530	108	18, 394	179	5, 263	6, 760	107	6, 370	18, 393

Bureau of Agricultural Economics. Compiled from Bureau of Census Reports. Linters are excluded. Quantities are in running bales, round bales counted as half bales and foreign in 500-pound bales.

[1] Total distribution usually is greater than total supply due principally to the inclusion, in all distribution items, of the "city crop," which consists of rebaled samples and pickings from cotton damaged by fire and weather.

TABLE 133.—*Cotton: Mill consumption of American and other growths in the world, United States, and foreign countries, 1913–14 to 1930–31*

Year beginning August [1]	World			United States			Foreign countries		
	All growths	American	Other growths	All growths	American	Other growths	All growths	American	Other growths
	1,000 bales [2]	*1,000 bales* [2]	*1,000 bales* [2]	*1,000 bales* [2]	*1,000 bales* [2]	*1,000 bales* [2]	*1,000 bales* [2]	*1,000 bales* [2]	*1,000 bales* [2]
1913–14	22, 200	13, 825	8, 375	5, 577	5, 383	194	16, 623	8, 442	8, 181
1914–15	20, 671	13, 249	7, 422	5, 597	5, 375	222	15, 074	7, 874	7, 200
1915–16	21, 978	13, 039	8, 939	6, 398	6, 081	317	15, 580	6, 958	8, 622
1916–17	21, 109	12, 561	8, 548	6, 789	6, 470	319	14, 320	6, 091	8, 229
1917–18	18, 516	10, 871	7, 645	6, 566	6, 382	184	11, 950	4, 489	7, 461
1918–19	16, 705	9, 909	6, 796	5, 766	5, 590	176	10, 939	4, 319	6, 620
1919–20	19, 300	11, 898	7, 402	6, 420	6, 003	417	12, 880	5, 895	6, 985
1920–21	16, 905	10, 268	6, 637	4, 893	4, 677	216	12, 012	5, 591	6, 421
1921–22	19, 990	12, 209	7, 781	5, 910	5, 613	297	14, 080	6, 596	7, 484
1922–23	21, 325	12, 446	8, 879	6, 666	6, 322	344	14, 659	6, 124	8, 535
1923–24	19, 982	10, 917	9, 065	5, 681	5, 353	328	14, 301	5, 564	8, 737
1924–25	22, 642	13, 311	9, 331	6, 193	5, 917	276	16, 449	7, 394	9, 055
1925–26	23, 930	14, 010	9, 920	6, 456	6, 176	280	17, 474	7, 834	9, 640
1926–27	25, 869	15, 748	10, 121	7, 190	6, 880	310	18, 679	8, 868	9, 811
1927–28	25, 285	15, 576	9, 709	6, 834	6, 535	299	18, 451	9, 041	9, 410
1928–29	25, 782	15, 226	10, 556	7, 091	6, 778	313	18, 691	8, 448	10, 243
1929–30	24, 878	13, 021	11, 857	6, 106	5, 803	303	18, 772	7, 218	11, 554
1930–31	22, 402	11, 113	11, 289	5, 263	5, 084	179	17, 139	6, 029	11, 110

Bureau of Agricultural Economist. Compiled from reports of the Bureau of the Census, U. S. Department of Commerce, except consumption figures for American cotton in foreign countries which are from the 1931 Cotton Year Book of the New York Cotton Exchange. The consumption figures for Other Growths in the world and in foreign countries were obtained by deduction.

[1] Year beginning Aug. 1, except 1913, which is the year beginning Sept. 1.

[2] American in running bales and other growths in bales of 478 pounds net. Prior to 1919–20 the quantities given for world consumption of all growths were reported in bales of 500 pounds net and have been converted to equivalent 478 pounds bales.

TABLE 134.—*Cotton: Consumption by domestic mills, 1919–20 to 1930–31, inclusive*

Month	Crop year											
	1919–20	1920–21	1921–22	1922–23	1923–24	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31
	1,000 bales	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*
August	497	484	467	526	492	357	451	500	634	526	559	353
September	491	458	485	494	486	438	483	571	628	492	546	393
October	556	401	494	534	543	534	544	568	614	616	640	443
November	491	333	528	579	533	495	544	584	627	611	541	415
December	512	295	511	529	464	534	576	603	539	533	453	406
January	592	367	527	610	578	594	582	603	586	668	576	450
February	516	395	472	567	509	551	565	590	573	595	494	433
March	576	438	520	624	486	583	636	693	581	632	508	491
April	567	409	444	577	479	597	578	618	525	632	532	509
May	541	441	495	621	414	532	516	630	577	669	473	465
June	555	462	509	542	350	494	519	660	510	570	405	454
July	526	410	458	463	347	484	462	570	440	547	379	451
Total	6,420	4,893	5,910	6,666	5,681	6,193	6,456	7,190	6,834	7,091	6,106	5,263

Bureau of the Census. Quantities are in running bales, round counted as half bales and foreign in 500 pound bales. Linters not included.

TABLE 135.—*Cotton: International trade, average, 1925–26 to 1929–30; annual, 1927–28 to 1930–31*

Country	Year beginning July									
	Average, 1925–26 to 1929–30		1927–28		1928–29		1929–30		1930–31 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*
United States	8,579	399	7,890	367	8,520	476	7,096	414	7,048	107
British India	2,938	176	2,528	167	3,250	88	3,270	117	3,152	388
Egypt	1,484	0	1,377	0	1,645	0	1,394	0	1,283	0
Brazil	119	0	62	0	53	0	290	0	109	0
Argentina	88	[2] 1	41	1	113	------	129	------	107	1
Total	13,208	576	11,898	535	13,581	564	12,179	531	11,699	496
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom	0	3,070	0	2,460	0	3,168	0	2,648	0	2,172
Japan	0	3,061	0	2,617	0	3,110	0	2,859	0	2,777
Germany	325	1,900	392	2,563	353	1,757	393	1,780	358	1,645
France	100	1,640	122	1,623	108	1,669	50	1,650	43	1,664
Italy	1	1,053	1	982	0	1,121	2	1,103	1	791
Czechoslovakia	4	567	2	629	1	566	1	518	1	450
Belgium	14	397	18	376	21	406	21	435	38	358
Poland	0	283	0	353	0	309	0	225	0	282
Canada	0	271	0	261	0	306	0	218	0	209
Netherlands	2	192	1	193	2	208	1	214	1	215
Austria	1	149	0	175	1	147	1	119	0	99
Switzerland	0	141	0	134	0	139	0	136	0	123
Sweden	0	106	0	111	0	101	0	105	0	96
Finland	0	39	0	46	0	38	0	30	0	36
Hungary	0	37	0	33	0	46	0	60	0	61
Estonia	0	25	0	26	0	24	0	28	0	18
Denmark	0	21	0	24	0	20	0	27	0	28
Norway	0	9	0	9	0	7	0	9	0	10
Total	447	12,961	536	12,615	486	13,142	469	12,164	442	11,034

Bureau of Agricultural Economics. Official sources except where otherwise noted. Bales of 500 pounds gross weight or 478 pounds net. The figures for cotton refer to ginned and unginned cotton and linters but not to mill waste, cotton batting, scarto (Egyptian and Sudan). Wherever unginned cotton has been separately stated in the original reports, it has been reduced to ginned cotton in this statement at the ratio of 3 pounds unginned to 1 pound ginned. Wherever linters are stated separately, they have been excluded from these figures.

[1] Preliminary. [2] 3-year average.

TABLE 136.—*Cotton, Middling: Average spot price per pound at 10 markets in stated years*

Market and crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
Norfolk:	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1930–31	11.93	10.80	10.28	10.61	9.67	9.79	10.58	10.63	10.00	9.24	8.80	8.98	10.11
1931–32	6.96	6.28	6.20	6.33	6.14	------	------	------	------	------	------	------	------
Augusta:													
1930–31	11.28	10.19	9.91	10.22	9.25	9.42	10.28	10.30	9.67	8.87	8.56	8.79	9.73
1931–32	6.83	5.99	5.97	6.16	5.99	------	------	------	------	------	------	------	------
Savannah:													
1930–31	11.11	10.30	10.06	10.36	9.43	9.56	10.41	10.41	9.79	8.84	8.61	8.86	9.81
1931–32	6.68	6.06	5.96	6.13	5.94	------	------	------	------	------	------	------	------
Montgomery:													
1930–31	10.72	9.72	9.43	9.90	8.90	8.99	9.73	9.77	9.26	8.37	8.16	8.36	9.28
1931–32	6.30	5.62	5.56	5.73	5.55	------	------	------	------	------	------	------	------
Memphis:													
1930–31	10.88	9.78	9.34	9.59	8.71	9.01	9.65	9.74	9.05	8.38	8.16	8.36	9.22
1931–32	6.20	5.39	5.52	5.69	5.55	------	------	------	------	------	------	------	------
Little Rock:													
1930–31	10.78	9.70	9.29	9.47	8.59	8.85	9.52	9.57	8.93	8.27	8.02	8.27	9.10
1931–32	6.13	5.29	5.36	5.57	5.46	------	------	------	------	------	------	------	------
Dallas:													
1930–31	10.64	9.71	9.41	9.63	8.72	9.07	9.77	9.78	9.07	8.26	7.91	8.35	9.19
1931–32	6.23	5.47	5.35	5.61	5.42	------	------	------	------	------	------	------	------
Houston:													
1930–31	11.24	10.33	9.99	10.22	9.31	9.56	10.28	10.31	9.60	8.79	8.54	8.70	9.74
1931–32	6.62	5.95	5.72	5.90	5.73	------	------	------	------	------	------	------	------
Galveston:													
1930–31	11.28	10.37	10.09	10.30	9.34	9.62	10.33	10.37	9.72	8.90	8.64	8.82	9.82
1931–32	6.72	6.06	5.82	6.02	5.94	------	------	------	------	------	------	------	------
New Orleans:													
1909–10	12.28	12.66	13.48	14.40	14.96	15.23	14.88	14.74	14.64	14.89	14.85	14.93	14.33
1910–11	14.92	13.49	14.21	14.50	14.85	14.95	14.62	14.54	14.70	15.48	15.26	14.30	14.65
1911–12	11.96	11.29	9.61	9.35	9.17	9.53	10.31	10.65	11.61	11.72	12.07	12.93	10.85
1912–13	12.07	11.37	10.95	12.15	12.81	12.58	12.61	12.45	12.44	12.29	12.44	12.34	12.20
1913–14	12.02	13.11	13.73	13.26	12.98	12.93	12.90	12.95	13.11	13.36	13.79	13.34	13.12
1914–15	(1)	[2] 8.42	7.02	7.43	7.18	7.87	8.01	8.34	9.43	9.04	9.12	8.71	------
1915–16	8.94	10.40	11.95	11.50	11.89	12.04	11.45	11.73	11.88	12.61	12.80	13.03	11.68
1916–17	14.26	15.27	17.24	19.45	18.34	17.33	17.14	17.94	19.51	20.06	24.18	25.41	18.84
1917–18	25.07	21.68	26.76	28.07	29.07	31.07	30.91	32.76	33.05	28.90	30.71	29.50	28.96
1918–19	30.23	33.22	31.18	29.75	29.44	28.84	26.97	26.84	26.70	29.22	32.09	33.93	29.87
1919–20	31.38	30.38	35.28	39.58	39.89	40.28	39.39	40.69	41.41	40.31	40.49	39.41	38.21
1920–21	34.03	27.48	20.95	17.65	14.59	14.53	12.85	11.08	11.17	11.80	11.03	11.49	16.55
1921–22	12.78	19.35	18.99	17.27	17.16	16.53	16.36	16.74	16.80	19.31	21.68	22.01	17.92
1922–23	21.55	20.74	22.05	25.34	25.48	27.51	28.78	30.43	28.42	26.63	28.61	25.73	25.94
1923–24	24.22	27.71	29.18	33.68	34.88	33.93	31.90	28.74	30.41	30.70	29.43	29.23	30.33
1924–25	26.65	22.79	23.48	23.95	23.66	23.66	24.61	25.52	24.52	23.54	24.07	24.05	24.21
1925–26	23.07	23.09	20.86	19.82	19.27	20.26	19.83	18.35	18.11	18.06	17.54	18.24	19.71
1926–27	18.01	16.14	12.68	12.52	12.22	13.17	13.82	14.10	14.42	15.68	16.47	17.63	14.74
1927–28	19.36	21.53	20.73	19.99	19.26	18.72	17.90	18.94	20.07	20.77	21.10	21.45	19.98
1928–29	19.00	17.94	18.79	19.00	19.36	19.14	19.07	19.97	19.23	18.74	18.81	18.73	18.98
1929–30	18.57	18.45	18.08	17.19	17.04	16.84	15.25	14.87	15.79	15.60	13.56	12.65	16.16
1930–31	11.56	10.58	10.40	10.63	9.65	9.87	10.63	10.59	9.95	9.08	8.86	9.10	10.08
1931–32	7.02	6.20	6.06	6.32	6.10	------	------	------	------	------	------	------	------
10 markets combined:													
1915–16	[3] 8.80	10.29	11.99	11.49	11.97	12.10	11.54	11.78	11.94	12.67	12.89	13.11	11.72
1916–17	14.32	15.31	17.38	19.54	18.44	17.70	[4] 16.54	18.29	19.72	20.15	24.33	25.45	18.96
1917–18	25.26	22.08	26.86	28.21	29.19	31.05	30.97	32.84	32.87	29.32	30.10	29.44	29.02
1918–19	31.05	33.38	31.11	29.27	29.22	28.51	26.55	26.40	26.84	29.21	31.84	33.80	29.76
1919–20	31.50	30.30	35.44	39.59	39.70	40.46	39.49	40.68	41.74	41.01	40.58	39.58	38.34
1920–21	34.78	28.24	21.38	17.83	14.63	14.42	12.93	11.19	11.01	11.55	10.77	11.13	16.66
1921–22	12.53	19.50	19.25	17.43	17.47	17.04	16.73	17.12	16.92	19.22	21.58	22.27	18.09
1922–23	21.53	20.72	22.11	25.20	25.40	27.39	28.62	30.21	28.28	26.47	28.20	25.87	25.83
1923–24	24.22	27.67	28.90	33.30	34.39	33.69	31.73	28.54	30.25	30.32	29.37	29.32	30.14
1924–25	27.16	22.74	23.29	23.63	23.40	23.53	24.51	25.51	24.56	23.61	24.19	24.55	24.22
1925–26	23.35	23.23	20.95	19.92	19.31	20.04	19.63	18.33	18.05	17.95	17.52	17.92	19.68
1926–27	17.65	15.96	12.40	12.17	11.81	12.72	13.45	13.74	14.08	15.38	16.10	17.34	14.40
1927–28	19.16	21.19	20.35	19.74	18.99	18.44	17.60	18.76	19.76	20.54	20.82	21.25	19.72
1928–29	18.72	17.72	18.46	18.70	19.07	18.88	18.86	19.78	18.95	18.23	18.36	18.29	18.67
1929–30	18.04	18.01	17.62	16.75	16.64	16.56	15.11	14.74	15.40	15.12	13.21	12.21	15.79
1930–31	11.14	10.15	9.82	10.09	9.16	9.37	10.12	10.15	9.50	8.70	8.42	8.66	9.61
1931–32	6.57	5.83	5.75	5.95	5.78	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Prior to Aug. 16, 1915, compiled from quotations in Market Reports of the New York Cotton Exchange, except Sept. 23 to Nov. 16, 1914, when the exchange was closed, quotations for which time were taken from the New York Commercial and Financial Chronicle; from Aug. 16, 1915, compiled from daily reports to the bureau from the cotton exchanges of the various markets. Data for earlier years appear in previous issues of the Yearbook.

1 Market closed.
2 No quotations prior to Sept. 23. Average for 7 days' business.
3 Does not include New Orleans.
4 Does not include Savannah.

TABLE 137.—*Cotton: Average staple premiums at New Orleans and discounts at New Orleans, Houston, and Galveston for Middling spot cotton, by months, 1924–25 to 1930–31*

PREMIUMS FOR STAPLES LONGER THAN ⅞ INCH, NEW ORLEANS

Crop year and staple length	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
1924–25	*Points*	*Points*	*Points*	*Points*	*Points*	*Points*	*Points*	*Points*	*Points*	*Points*	*Points*	*Points*	*Points*
15/16 inch	60	60	65	65	65	65	65	65	65	70	75	75	66
1 inch	75	75	75	75	80	80	85	80	90	110	120	110	88
1 1/16 inches	100	106	125	125	125	160	175	175	250	250	250	250	174
1⅛ inches	175	175	175	225	250	360	400	400	550	530	550	500	362
1 3/16 inches	275	281	300	375	400	530	650	650	800	800	800	800	555
1¼ inches	400	412	450	525	550	820	1,000	1,000	1,150	1,150	1,150	1,150	813
1925–26													
15/16 inch	75	75	75	75	85	100	90	80	80	75	75	75	80
1 inch	100	100	100	105	115	125	120	110	100	100	100	100	106
1 1/16 inches	250	194	175	231	250	250	250	200	200	200	200	200	217
1⅛ inches	550	287	300	375	400	400	400	350	350	350	350	350	372
1 3/16 inches	800	625	575	537	600	600	600	550	550	550	550	550	591
1¼ inches	1,150	887	800	850	900	900	900	900	900	900	900	900	907
1926–27													
15/16 inch	40	65	65	65	65	65	65	65	65	65	65	65	58
1 inch	75	110	110	100	100	100	100	100	100	100	100	100	100
1 1/16 inches	200	200	125	138	150	150	150	150	150	200	200	200	168
1⅛ inches	350	350	235	238	250	250	250	250	250	300	300	300	277
1 3/16 inches	550	550	410	450	450	450	450	450	450	500	513	590	484
1¼ inches	900	900	670	800	840	875	900	900	900	900	900	900	730
1927–28													
15/16 inch	40	40	40	40	50	40	35	35	25	20	20	20	34
1 inch	75	75	75	75	100	100	100	100	75	60	60	60	80
1 1/16 inches	163	169	250	238	200	200	200	200	175	175	170	150	191
1⅛ inches	244	263	350	338	300	300	300	300	250	250	245	225	280
1 3/16 inches	525	513	550	513	400	400	400	400	350	350	340	300	420
1¼ inches	788	788	850	800	650	650	650	650	550	550	535	475	661
1928–29													
15/16 inch	20	20	30	29	20	15	19	25	25	37	40	40	27
1 inch	60	60	84	95	85	75	75	75	92	104	118	125	87
1 1/16 inches	150	150	150	150	150	150	150	150	150	165	200	225	162
1⅛ inches	225	206	200	200	200	200	200	200	200	230	275	300	220
1 3/16 inches	300	300	300	300	300	300	300	300	300	345	400	425	323
1¼ inches	475	494	488	450	450	450	450	450	450	540	675	750	510
1929–30													
15/16 inch	40	31	30	30	40	49	50	50	50	50	50	50	43
1 inch	125	103	100	100	100	100	100	100	100	100	100	100	102
1 1/16 inches	225	175	175	175	175	175	175	175	175	175	175	175	179
1⅛ inches	300	225	225	225	225	225	225	225	225	225	225	225	231
1 3/16 inches	425	325	325	325	350	350	350	350	350	350	350	350	350
1¼ inches	680	600	575	580	600	600	600	600	600	600	600	600	603
1930–31													
15/16 inch	50	50	40	40	40	40	40	40	40	40	40	40	42
1 inch	100	100	75	75	75	75	75	75	75	75	75	75	79
1 1/16 inches	175	175	150	150	150	150	150	150	150	150	150	150	154
1⅛ inches	225	225	175	175	175	175	175	175	175	175	175	175	183
1 3/16 inches	350	350	300	300	300	300	300	300	300	300	300	300	308
1¼ inches	[1] 600	[1] 600	[1] 600	[1] 600	[1] 600	[1] 600	[1] 600	[1] 600	[1] 600	[1] 600	[1] 600	[1] 600	[1] 600

DISCOUNTS [2] FOR 13/16 INCH, AVERAGE OF NEW ORLEANS, HOUSTON, AND GALVESTON

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
1924–25	50	50	50	75	100	100	100	100	100	100	100	100	85
1925–26	150	150	150	150	150	125	125	100	100	100	100	100	125
1926–27	100	100	100	100	100	100	100	100	100	100	100	100	100
1927–28	75	75	75	100	125	125	100	100	100	100	75	75	94
1928–29	50	50	50	65	65	75	75	75	75	75	75	75	67
1929–30	75	75	100	125	150	150	125	100	100	100	100	100	108
1930–31	100	100	100	100	100	100	95	95	95	80	88	85	95

Bureau of Agricultural Economics. Based on weekly quotations for Middling ⅞-inch staple. Premiums and discounts are stated in points or hundredths of a cent per pound. See Table 268, p. 852, 1928 Yearbook, for data for earlier years.

[1] Nominal. [2] Discounts are calculated from actual sales and partially estimated.

TABLE 138.—*Cotton: Average monthly premiums and discounts for grades* [1] *above and below Middling for the 10 designated spot markets, 1927–28 to 1930–31*

Month and crop year	Middling fair	Strict Good Middling	Good Middling	Strict Middling	Middling (average price) [2]	Strict Low Middling	Low Middling	Strict Good Ordinary [3]	Good Ordinary [3]
August:	*On* [4]	*On*	*On*	*On*	*Cents per lb.*	*Off* [4]	*Off*	*Off*	*Off*
1927–28	130	106	76	51	19.16	103	213	333	448
1928–29	84	60	39	26	18.72	44	98	164	234
1929–30	80	62	48	32	18.04	75	160	250	340
1930–31	90	74	57	37	11.14	71	172	287	389
September:									
1927–28	125	102	73	49	21.19	100	211	333	447
1928–29	83	59	39	25	17.72	67	138	209	285
1929–30	72	55	40	25	18.01	75	159	252	342
1930–31	87	70	51	31	10.15	70	169	279	380
October:									
1927–28	124	101	68	48	20.35	82	187	307	417
1928–29	83	62	41	26	18.46	79	159	237	321
1929–30	74	56	42	26	17.62	77	165	266	359
1930–31	89	70	51	30	9.82	70	163	265	359
November:									
1927–28	105	83	60	41	19.74	48	124	221	314
1928–29	81	61	41	26	18.70	81	161	242	327
1929–30	78	60	46	30	16.75	78	170	278	375
1930–31	89	70	51	30	10.09	70	162	261	359
December:									
1927–28	94	69	45	30	18.99	36	85	162	241
1928–29	78	58	39	25	19.07	79	157	238	322
1929–30	83	67	52	37	16.64	75	173	280	378
1930–31	88	70	51	30	9.16	66	151	243	339
January:									
1927–28	93	68	44	29	18.44	35	80	150	227
1928–29	77	57	39	25	18.87	78	162	247	336
1929–30	103	85	69	49	16.56	75	170	280	378
1930–31	87	70	51	30	9.37	60	138	220	295
February:									
1927–28	91	65	40	25	17.60	34	74	146	220
1928–29	78	58	39	26	18.86	78	162	250	340
1929–30	107	89	72	50	15.11	75	170	280	378
1930–31	87	70	51	30	10.12	54	132	210	277
March:									
1927–28	91	65	40	25	18.76	33	73	138	213
1928–29	79	59	41	28	19.77	77	161	250	340
1929–30	105	88	72	50	14.74	73	174	282	384
1930–31	88	70	52	31	10.15	51	127	204	269
April:									
1927–28	90	64	39	25	19.77	33	73	138	213
1928–29	80	60	42	29	18.94	76	161	250	340
1929–30	100	86	72	50	15.40	72	178	290	395
1930–31	88	70	52	31	9.50	51	125	197	261
May:									
1927–28	89	64	40	25	20.53	33	77	143	218
1928–29	80	61	43	30	18.24	75	160	250	340
1929–30	101	86	71	49	15.12	72	173	290	394
1930–31	88	70	52	31	8.70	50	117	190	252
June:									
1927–28	87	63	40	26	20.82	34	80	147	222
1928–29	83	64	49	35	18.36	74	160	250	340
1929–30	101	86	71	49	13.21	72	175	293	395
1930–31	88	70	52	31	8.42	50	101	176	237
July:									
1927–28	85	61	39	26	21.25	37	86	153	227
1928–29	84	65	51	38	18.29	73	160	250	340
1929–30	101	86	71	50	12.21	71	175	293	395
1930–31	88	70	52	31	8.66	49	100	175	236
Average:									
1927–28	100	76	50	33	19.72	51	114	198	284
1928–29	81	60	42	28	18.67	73	153	236	322
1929–30	92	76	61	41	15.79	74	170	278	376
1930–31	88	70	52	31	9.61	59	138	226	304

Bureau of Agricultural Economics.

[1] White standards.
[2] Based on ⅞-inch staple.
[3] These grades are not deliverable on future contracts.
[4] The differences are stated in terms of points or hundredths of a cent per pound. By "On" is meant that the stated number of points is to be added to the price of Middling and by "Off" is meant that the stated number of points is to be subtracted from the price of Middling.

TABLE 139.—*Cotton: Estimated average price per pound received by producers, United States, 1922–23 to 1931–32*

Crop year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	20.9	20.6	21.2	23.1	24.2	25.2	26.8	28.0	27.6	26.2	25.9	24.8	22.8
1923–24	23.8	25.6	28.0	29.9	32.1	32.5	31.4	27.7	28.7	28.1	27.8	27.3	28.7
1924–25	27.8	22.2	23.1	22.5	22.2	22.7	23.0	24.5	23.7	23.0	23.0	23.4	22.9
1925–26	23.4	22.5	21.5	18.1	17.4	17.4	17.6	16.5	16.6	16.0	16.1	15.4	19.6
1926–27	16.1	16.8	11.7	11.0	10.0	10.6	11.5	12.5	12.3	13.9	14.8	15.5	12.5
1927–28	17.1	22.5	21.0	20.0	18.7	18.6	17.0	17.8	18.7	20.1	19.7	21.0	20.2
1928–29	18.8	17.6	18.1	17.8	18.0	17.9	18.0	18.8	18.5	18.0	17.9	17.8	18.0
1929–30	18.0	18.2	17.5	16.2	16.0	15.8	14.8	13.8	14.7	14.5	14.0	11.9	16.8
1930–31	11.4	9.9	9.2	9.6	8.7	8.6	9.1	9.6	9.3	8.8	7.7	8.5	9.5
1931–32	6.3	5.9	5.3	6.1	5.5	------	------	------	------	------	------	------	--------

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by bales marketed monthly. Mean of prices reported on 1st of month and 1st of succeeding month, August, 1909, to December, 1923.

TABLE 140.—*Cotton: Average spot price per pound of specified descriptions at Liverpool, 1922–23 to 1931–32*

Description and crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
American Middling:[1]	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	24.90	23.98	24.55	27.96	28.26	30.64	30.93	31.42	30.29	28.43	31.53	29.28	28.51
1923–24	28.18	31.99	31.96	35.74	36.00	34.33	32.53	29.77	33.15	32.00	30.74	30.38	31.90
1924–25	31.62	25.06	26.13	26.09	25.73	25.90	27.17	27.95	26.85	25.83	27.34	27.76	26.12
1925–26	26.28	26.25	23.17	21.51	20.51	21.68	21.40	20.32	20.31	20.73	19.98	19.76	21.82
1926–27	19.69	19.35	14.51	14.08	13.34	14.55	15.56	15.65	16.24	17.90	18.55	19.42	16.57
1927–28	21.10	24.17	23.36	22.73	21.98	21.68	20.53	21.80	22.75	23.52	23.82	24.44	22.66
1928–29	21.39	20.87	21.85	21.62	21.57	21.39	21.09	22.33	21.56	20.66	20.88	21.09	21.36
1929–30	21.01	20.95	20.47	19.61	19.22	18.97	17.36	16.83	17.67	17.47	16.16	15.47	18.43
1930–31	14.08	12.64	11.80	12.05	11.03	11.11	12.06	12.10	11.42	10.56	9.99	10.26	11.59
1931–32	7.92	7.71	7.65	7.70	7.38	------	------	------	------	------	------	------	------
Egyptian uppers, good:[2]													
1922–23	28.1	27.4	27.3	30.7	31.2	31.9	32.5	33.9	33.0	30.4	31.9	31.0	30.8
1923–24	31.5	33.4	33.5	39.6	41.5	39.7	39.0	37.5	41.2	43.9	43.3	43.6	39.0
1924–25	45.6	35.5	34.3	35.4	37.5	40.3	41.3	45.1	43.6	42.1	41.6	41.4	40.0
1925–26	39.5	37.1	35.0	32.6	30.8	29.9	28.5	26.2	25.9	27.3	26.2	25.2	30.3
1926–27	26.0	28.0	23.8	22.2	19.4	21.8	24.3	23.5	23.3	26.7	28.3	30.2	24.4
1927–28	32.0	33.2	31.8	31.3	29.9	28.3	27.6	30.0	32.7	33.3	31.3	30.4	31.8
1928–29	27.1	25.1	25.9	25.6	25.5	25.5	25.0	26.7	25.7	24.0	23.5	23.7	25.3
1929–30	23.6	24.2	23.0	22.3	22.0	22.0	21.4	21.3	21.8	21.6	20.5	20.8	22.0
1930–31	19.1	18.0	14.5	14.0	13.0	13.4	15.0	15.0	14.0	13.4	12.6	13.1	14.6
1931–32	10.2	10.2	9.6	9.6	8.7	------	------	------	------	------	------	------	------
No. 1 Oomras, fully good:[2]													
1922–23	19.8	18.9	18.8	20.6	20.5	21.9	22.2	21.7	20.7	19.4	20.8	20.2	20.5
1923–24	19.6	21.8	22.0	25.9	27.7	26.1	25.2	22.4	24.0	22.9	22.6	22.0	23.5
1924–25	23.4	19.7	22.3	23.3	23.5	22.6	23.5	23.2	22.2	21.2	21.6	22.0	22.4
1925–26	21.5	22.0	19.9	18.1	16.8	17.4	16.8	15.4	15.1	15.6	15.0	15.2	17.4
1926–27	15.5	15.4	12.5	12.1	11.5	12.5	13.3	13.4	13.9	15.4	16.2	17.0	14.1
1927–28	17.9	20.1	19.3	17.7	17.6	17.4	16.5	17.5	17.9	18.3	18.6	18.5	18.1
1928–29	16.0	14.7	15.7	15.9	16.4	17.1	15.8	16.9	15.5	14.8	15.1	15.3	15.8
1929–30	15.1	15.0	14.7	13.9	13.7	13.2	11.5	10.8	11.0	10.8	9.6	8.7	12.3
1930–31	7.8	7.8	7.7	8.2	7.4	7.4	8.4	8.4	7.9	7.5	7.3	7.8	7.8
1931–32	6.0	5.9	6.2	6.7	6.5	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Conversions at monthly average rates of exchange August 1922–December 1925 and September, 1931 to date, and at par January 1926–August 1931, as given in Federal Reserve Bulletins.

[1] International Yearbook of Agricultural Statistics, 1921, p. 443. London Economist, 1922 to August 1927. Subsequently from Liverpool Cotton Association Daily Report. Average of weekly quotations.

[2] London Economist, average of weekly quotations to August, 1927, inclusive. Subsequently from Liverpool Cotton Association Daily Report.

TABLE 141.—*Cottonseed: Estimated production, and estimated price December 1, by States, 1924–1931*

State	Production, year beginning August [1]								Estimated price per short ton							
	1924	1925	1926	1927	1928	1929	1930	1931	1924	1925	1926	1927	1928	1929	1930	1931
	1,000 short tons	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Missouri	86	133	97	51	65	98	67	120	32.40	36.00	16.80	36.90	35.00	31.00	22.00	10.50
Virginia	17	23	23	14	19	21	19	19	36.30	35.00	26.00	42.00	41.00	30.00	20.00	11.00
North Carolina	366	488	539	382	371	331	343	344	35.00	33.00	22.00	37.00	40.00	29.00	22.00	12.00
South Carolina	357	394	448	324	322	368	444	450	36.10	32.00	21.00	39.50	39.00	28.00	22.00	12.00
Georgia	445	516	664	488	457	596	707	619	34.10	33.00	21.00	38.50	37.00	28.00	21.00	11.50
Florida	10	17	14	8	9	13	22	19	32.10	34.00	19.00	30.50	36.00	30.00	22.00	10.60
Tennessee	157	229	200	159	190	229	167	269	35.20	25.50	19.00	37.00	38.00	29.00	21.75	9.10
Alabama	438	602	665	529	492	596	655	636	34.30	29.00	19.00	37.00	38.00	29.00	20.00	11.00
Mississippi	487	884	838	602	655	851	650	766	35.70	22.00	21.00	38.50	39.00	32.50	23.50	11.00
Arkansas	486	711	687	444	554	638	388	825	33.20	18.30	17.50	36.50	37.50	29.00	21.00	9.00
Louisiana	219	404	368	243	307	359	317	384	29.20	24.50	18.00	33.00	32.50	31.00	20.00	9.00
Oklahoma	671	751	787	461	536	508	379	543	28.60	26.50	15.40	37.00	34.00	31.00	22.00	9.70
Texas	2.197	1.849	2,499	1,938	2,274	1,755	1,794	2,348	31.10	28.50	17.50	36.00	35.00	32.00	22.00	10.30
New Mexico	25	30	33	31	39	40	44	44	30.00	28.00	18.00	30.00	32.00	28.00	22.00	11.00
Arizona	48	53	54	41	66	68	69	53	21.20	26.60	18.00	30.00	30.00	26.00	20.00	10.00
California	35	54	58	40	76	115	117	80	40.00	40.00	20.00	37.50	31.50	27.00	21.00	12.60
All other	6	11	8	4	3	4	3	4	34.00	36.00	20.00	37.25	37.33	29.25	21.29	10.25
United States	6,051	7,150	7,982	5,759	6,435	6,590	6,185	7,523	32.39	27.27	18.68	36.80	36.28	30.33	21.61	10.45

Bureau of Agricultural Economics.

[1] Compiled from reports of Bureau of Census. Estimated production of lint, by States (December preliminary estimate for 1931), in rounded thousands of 500 pounds gross weight bales, adjusting for net weight and assuming 65 pounds of cottonseed for each 35 net pounds of lint.

TABLE 142.—*Cottonseed oil: International trade, average 1925–1929, annual 1927–1930*

Country	Calendar year									
	Average, 1925–1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
United States	49,815	0	67,982	0	51,702	0	26,075	0	28,297	0
United Kingdom	46,146	18,657	47,044	17,315	35,798	16,742	53,715	23,090	38,835	36,035
Egypt	22,724	80	31,229	0	17,579	3	26,181	2	24,717	------
Peru	9,526	0	15,596	0	11,077	0	3,047	0	6,947	0
Brazil	351	23	0	16	21	0	1	4	2,314	2
Algeria	38	29	[2] 25	[2] 85	[2] 2	[2] 0	[2] 46	[2] 5	------	------
Total	128,600	18,789	161,876	17,416	116,179	16,745	109,065	23,101	101,110	36,037
PRINCIPAL IMPORTING COUNTRIES										
Canada	0	39,439	0	54,118	0	44,324	0	38,675	0	27,171
Germany	[3] 283	19,296	34	25,897	20	12,984	912	13,649	1,472	12,293
Netherlands	6,481	16,831	9,838	24,370	7,264	8,685	3,815	7,474	119	810
France	34	7,933	55	7,597	2	7,142	52	8,828	61	8,836
Denmark	809	6,624	609	6,131	1,224	6,493	1,369	7,378	------	4,685
Norway	0	4,474	0	5,582	0	2,798	0	2,648	0	1,364
Cuba	0	4,099	0	6,081	0	1,857	0	419	0	1,824
Sweden	447	2,824	1,097	3,295	49	2,721	473	3,071	------	3,082
Belgium	15	2,480	4	3,918	51	2,026	11	1,782	102	687
Australia [2]	1	1,914	3	1,664	0	2,967	0	2,651	------	------
Greece	0	1,478	0	3,315	0	1,201	0	494	0	36
Argentina	53	1,470	210	2,461	17	946	27	1,340	6	147
Gambia [2]	9	622	0	668	4	979	40	453	------	------
Yugoslavia	0	498	0	647	0	368	0	181	0	47
Uruguay	0	293	0	565	0	331	0	[2] 39	0	------
Czechoslovakia	0	267	0	130	0	281	0	328	0	216
Italy	1	216	1	59	0	327	2	358	1	290
Total	8,133	110,758	11,851	146,498	8,631	96,430	6,701	89,768	1,761	61,488

Bureau of Agricultural Economics. Official sources except where otherwise noted.

[1] Preliminary. [2] International Yearbook of Agricultural States. [3] 4-year average.

TABLE 143.—*Cottonseed: Estimated average price per ton received by producers, United States, 1922–23 to 1931–32*

Crop year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weighted average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	32.44	25.37	31.79	40.18	42.93	43.35	45.16	46.32	47.60	46.58	43.14	41.42	34.70
1923–24	37.47	40.88	40.90	45.92	45.54	44.37	43.27	41.34	40.42	40.53	39.96	39.07	42.23
1924–25	38.44	31.74	31.95	33.57	35.48	37.50	37.14	38.21	37.94	38.61	36.66	36.41	34.08
1925–26	36.52	33.48	32.82	27.64	27.87	28.40	29.06	29.47	31.51	30.84	31.89	31.31	30.82
1926–27	29.73	27.38	20.06	18.66	18.05	18.55	22.39	25.43	25.80	26.05	26.27	26.59	21.55
1927–28	25.95	34.41	36.60	37.51	37.14	37.40	37.44	37.77	39.40	43.00	41.25	39.27	35.94
1928–29	36.87	31.02	34.08	37.17	37.74	38.05	38.73	39.36	38.94	37.78	35.83	34.84	35.26
1929–30	32.69	31.03	31.40	30.75	30.31	28.95	28.89	28.63	29.74	30.61	29.66	27.35	30.43
1930–31	23.99	23.89	20.73	21.26	21.28	21.25	21.87	22.43	22.85	22.32	20.32	19.52	21.93
1931–32	14.71	8.93	7.66	11.61	11.01								

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly receipts at oil mills.

TABLE 144.—*Cottonseed and cottonseed products: Production in the United States, 1909–10 to 1930–31*

Year beginning August	Cottonseed: Produced	Cottonseed: Crushed	Cottonseed products: Crude oil	Cottonseed products: Cake and meal	Cottonseed products: Hulls	Year beginning August	Cottonseed: Produced	Cottonseed: Crushed	Cottonseed products: Crude oil	Cottonseed products: Cake and meal	Cottonseed products: Hulls
	1,000 short tons	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*		*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*
1909–10	4,462	3,269	491	1,326	1,289	1920–21	5,971	4,069	655	1,786	1,256
1910–11	5,175	4,106	630	1,792	1,375	1921–22	3,531	3,008	465	1,355	937
1911–12	6,997	4,921	756	2,151	1,642	1922–23	4,336	3,242	501	1,487	944
1912–13	6,104	4,580	697	1,999	1,540	1923–24	4,502	3,308	490	1,518	941
1913–14	6,305	4,848	725	2,220	1,400	1924–25	6,051	4,605	702	2,126	1,331
1914–15	7,186	5,780	860	2,648	1,677	1925–26	7,150	5,558	809	2,597	1,547
1915–16	4,992	4,202	627	1,923	1,220	1926–27	7,989	6,306	944	2,840	1,854
1916–17	5,113	4,479	704	2,225	969	1927–28	5,758	4,654	738	2,093	1,320
1917–18	5,040	4,252	656	2,068	996	1928–29	6,435	5,061	802	2,282	1,368
1918–19	5,360	4,479	663	2,170	1,137	1929–30	6,590	5,016	786	2,232	1,384
1919–20	5,074	4,013	606	1,817	1,143	1930–31	6,185	4,714	721	2,162	1,303

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census.

TABLE 145.—*Cottonseed oil, crude: Average price per pound in tanks, f. o. b. southeast mills, by months, 1922–23 to 1931–32*

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	8.50	6.46	7.34	8.30	8.52	9.84	9.92	10.45	10.25	9.88	9.75	9.00	9.02
1923–24		9.94	9.44	9.88	9.45	9.46	8.84	8.46	8.74	8.20	8.78	10.06	
1924–25	11.30	8.34	9.03	8.85	9.69	9.48	9.20	9.95	10.00	9.34	9.75		
1925–26		9.14	8.55	8.90	8.98	9.75	10.71	11.00	11.22	12.17			
1926–27	10.88	8.19	7.44	6.64	6.36	6.94	8.20	7.73	7.33	7.74	8.04		
1927–28	8.70	9.25	9.45	9.05	8.72	8.48	7.75	8.44	8.75	8.88			
1928–29		8.16	8.14	8.24	8.38	8.63	9.12	9.00	8.37	7.94			
1929–30		7.66	7.33	7.38	7.26	7.24	7.40	7.13	7.48	7.32	6.95	7.00	
1930–31	6.76	6.48	6.14	6.35	6.12	6.18	6.37	6.75	6.72	6.38	6.27		
1931–32		3.60	3.54	3.80	[1] 3.33								

Bureau of Agricultural Economics. Compiled from the Oil, Paint, and Drug Reporter; prices, 1922–23 to 1927–28 are averages of weekly quotations; beginning 1928–29, averages of daily quotations.
Data for 1909–10 to 1921–22 are available in the 1930 Yearbook, p. 695, Table 149.

[1] Less than 10 quotations during the month. Other quotations were bids.

TABLE 146.—*Cottonseed oil, prime summer yellow: Average spot price per pound, New York, 1922–23 to 1931–32* [1]

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	9.96	8.54	8.88	9.51	9.81	10.77	10.90	11.78	11.76	11.60	11.48	10.35	10.44
1923–24	10.34	11.62	12.01	11.67	11.00	11.00	10.03	9.77	10.09	9.82	10.42	11.98	10.81
1924–25	13.83	10.54	11.00	10.86	11.41	11.10	10.69	11.10	11.08	10.51	10.75	11.38	11.19
1925–26	11.09	10.81	9.86	10.32	10.47	11.33	11.28	12.24	12.38	14.48	15.38	14.99	12.05
1926–27	12.99	11.42	8.82	8.20	8.22	8.50	9.31	9.39	8.78	9.09	9.19	9.57	9.46
1927–28	9.89	10.74	10.83	10.55	10.06	10.02	9.27	9.64	10.04	10.52	10.22	10.03	10.15
1928–29	9.44	10.03	9.84	9.69	10.21	20.33	10.88	10.74	10.11	9.75	9.64	9.62	10.02
1929–30	9.27	9.19	9.23	9.01	8.77	8.46	8.46	8.41	8.80	8.76	8.23	7.99	8.72
1930–31	8.34	8.20	7.60	7.57	7.28	7.20	7.29	7.58	7.55	6.99	6.76	7.00	7.45
1931–32	5.77	4.39	4.48	4.55	4.09	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from Oil, Paint, and Drug Reporter average of daily ranges. Data for 1890–91 to 1921–22 are available in 1924 Yearbook, p. 766, Table 323.

[1] Prices through July, 1930, quoted in barrels; beginning August, 1930, quoted in tanks.

TABLE 147.—*Cottonseed meal, 41 per cent protein: Price per ton, Memphis, 1922–23 to 1931–32*

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	35.30	34.30	40.25	46.00	45.40	45.75	45.00	43.60	43.10	42.40	40.80	41.40	41.90
1923–24	43.20	42.90	44.90	47.40	45.00	43.60	41.00	39.60	39.50	39.50	40.25	43.60	42.50
1924–25	43.60	41.40	40.75	38.75	39.25	37.70	35.75	35.90	36.80	38.40	38.80	41.50	39.00
1925–26	44.10	36.90	34.40	34.10	34.00	32.60	31.10	31.00	31.90	30.70	31.00	31.10	33.60
1926–27	32.10	28.90	23.90	23.70	24.50	30.10	33.50	32.40	32.50	34.00	37.40	36.00	30.75
1927–28	(1)	37.40	37.70	39.60	41.40	40.40	45.10	49.30	55.50	61.50	(1)	41.50	------
1928–29	(1)	38.40	43.90	44.20	45.60	44.90	44.40	42.70	38.75	35.50	34.25	38.75	------
1929–30	(1)	41.00	39.30	37.80	37.00	35.40	33.50	33.60	36.75	38.00	35.50	33.60	------
1930–31	36.25	30.90	27.50	27.50	25.60	25.75	24.90	26.40	26.25	24.60	22.40	21.20	26.60
1931–32	17.30	13.80	13.20	16.60	14.45	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from reports made to the bureau.

[1] Not reported.

TABLE 148.—*Cottonseed meal, 41 per cent protein, bagged: Average price per ton at 11 markets, 1931*

Market	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Boston	34.00	34.00	34.20	34.60	33.40	31.60	30.90	26.40	22.25	22.25	26.30	23.60
Philadelphia	33.75	33.00	33.40	33.90	32.20	32.80	29.20	26.00	-------	22.20	25.30	23.00
Buffalo	32.30	31.40	32.60	32.50	29.50	29.10	28.00	23.90	20.75	19.90	23.00	20.80
Pittsburgh	32.40	31.40	32.00	32.75	30.80	28.40	27.50	23.20	19.60	19.50	22.70	20.60
Cincinnati	31.00	30.00	30.60	31.10	29.40	27.20	26.20	22.20	18.30	17.90	21.25	19.30
Chicago	30.20	29.80	30.70	31.00	28.90	26.75	26.00	22.10	18.90	17.60	21.40	19.10
Milwaukee	29.00	29.25	31.10	30.60	30.50	27.50	27.80	23.00	19.50	18.70	22.20	20.40
Minneapolis	31.70	31.25	31.60	32.40	30.40	-------	27.75	-------	-------	20.40	23.70	21.20
Los Angeles	33.00	31.50	26.80	26.00	26.00	26.00	26.00	22.50	21.60	21.25	29.10	26.40
St. Louis	28.80	28.40	29.60	29.60	27.70	25.60	24.40	20.60	17.20	16.20	21.25	17.60
San Francisco	33.50	32.40	30.10	30.50	30.00	29.50	28.00	26.40	22.10	22.50	28.50	28.75

Bureau of Agricultural Economics. Compiled from reports made to the bureau.

TABLE 149.—*Sugar beets: Acreage, production, and value, United States,*[1] *1911–1931*

Year	Acreage	Yield per acre	Production	Seasonal farm price per ton	Value	Year	Acreage	Yield per acre	Production	Seasonal farm price per ton	Value
	1,000 acres	*Short tons*	*1,000 short tons*	*Dollars*	*1,000 dollars*		*1,000 acres*	*Short tons*	*1,000 short tons*	*Dollars*	*1,000 dollars*
1911	474	10.7	5,062	5.50	27,841	1922	530	9.8	5,183	7.91	41,017
1912	555	10.2	5,648	5.82	32,871	1923	657	10.7	7,006	8.99	62,965
1913	580	10.1	5,886	5.69	33,491	1924	815	9.2	7,489	7.99	59,834
1914	483	11.6	5,585	5.45	30,438	1925	647	11.4	7,381	6.39	47,147
1915	611	10.7	6,511	5.67	36,950	1926	677	10.7	7,223	7.61	54,964
1916	665	9.4	6,228	6.12	38,139	1927	721	10.8	7,753	7.67	59,455
1917	665	9.0	5,980	7.39	44,192	1928	644	11.0	7,101	7.11	50,477
1918	594	10.0	5,949	10.00	59,494	1929	688	10.6	7,315	7.08	51,805
1919	692	9.3	6,421	11.74	75,420	1930	775	11.9	9,199	7.14	65,697
1920	872	9.8	8,538	11.63	99,324	1931 [2]	720	11.0	7,933	5.92	46,958
1921	815	9.6	7,782	6.35	49,392						

Bureau of Agricultural Economics.

[1] Most years from 1911 to 1923 include a small unknown quantity of beets grown in Canada for Michigan factories.

[2] Preliminary.

TABLE 150.—*Sugar beets: Acreage, production and value, by States, 1927–1931*

State	Acreage					Production					Yield per acre				
	1927	1928	1929	1930	1931 [1]	1927	1928	1929	1930	1931 [1]	1927	1928	1929	1930	1931
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*
Michigan	99	71	52	74	59	698	452	300	513	590	7.0	6.4	5.8	6.9	10.0
Nebraska	82	86	92	81	66	1,036	1,021	1,054	1,136	891	12.6	11.9	11.5	14.0	13.5
Montana	32	28	38	45	54	364	258	386	572	614	11.4	9.2	10.2	12.7	11.4
Idaho	29	27	48	44	34	381	297	492	446	299	13.1	11.0	10.2	10.1	8.8
Wyoming	37	44	47	46	49	431	462	487	646	556	11.6	10.5	10.4	14.0	11.4
Colorado	218	179	210	242	226	2,774	2,394	2,612	3,312	2,537	12.7	13.4	12.4	13.7	11.2
Utah	55	51	45	44	49	677	637	565	553	504	12.3	12.5	12.6	12.6	10.3
California	59	49	46	65	90	476	638	545	768	1,067	8.1	13.0	11.8	11.8	11.9
Other States [2]	110	109	110	134	93	916	942	874	1,253	875	8.3	8.6	8.0	9.3	9.4
United States	721	644	688	775	720	7,753	7,101	7,315	9,199	7,933	10.8	11.0	10.6	11.9	11.0
Canada for U.S. factories	11	2	6	8	(3)	69	10	51	63	3	6.3	5.0	8.5	7.9	8.0

State	Seasonal farm price					Value				
	1927	1928	1929	1930	1931	1927	1928	1929	1930	1931
	Dolls. per short ton	*Dolls. per short ton*	*Dolls. per short ton*	*Dolls. per short ton*	*Dolls. per short ton*	*1,000 dolls.*	*1,000 dolls.*	*1,000 dolls.*	*1,000 dolls.*	*1,000 dolls.*
Michigan	7.16	7.22	7.94	8.08		4,996	3,263	2,381	4,143	
Nebraska	7.96	6.98	6.96	6.95		8,241	7,127	7,332	7,893	
Montana	8.22	7.36	7.29	7.32		2,996	1,897	2,815	4,191	
Idaho	7.50	7.44	7.17	7.41		2,854	2,210	3,530	3,302	
Wyoming	7.67	7.21	7.18	7.19		3,303	3,326	3,495	4,644	
Colorado	7.84	6.97	6.93	6.91		21,758	16,687	18,106	22,873	
Utah	7.03	7.03	7.05	7.00		4,761	4,478	3,986	3,874	
California	9.28	8.03	7.28	7.46		4,418	5,121	3,966	5,731	
Other States [2]			7.09	7.22				6,194	9,046	
United States	7.67	7.11	7.08	7.14	5.92	59,455	50,477	51,805	65,697	46,958

Bureau of Agricultural Economics.

[1] Preliminary.

[2] Includes Ohio, Indiana, Illinois, Wisconsin, Minnestoa, Iowa, North Dakota, South Dakota, Kansas, New Mexico, and Washington.

[3] Less than 500 acres.

TABLE 151.—*Sugar beets: Acreage, yield per acre, and production in specified countries, 1929–1931*

Country	Acreage			Yield per acre			Production		
	1929	1930	1931[1]	1929	1930	1931[1]	1929	1930	1931[1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*Short tons*	*Short tons*	*Short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*
Canada	43	52	52	8.5	9.1	9.7	364	471	504
United States	687	775	720	10.6	11.9	11.0	7,315	9,199	7,933
United Kingdom	231	349	234	9.7	9.8	9.6	2,244	3,428	2,246
Sweden	68	91	91	12.4	14.7	10.9	845	1,339	992
Denmark	74	86	75	13.5	13.7	12.2	1,000	1,179	915
Netherlands	136	142	91	16.7	16.6	12.3	2,271	2,356	1,117
Belgium	143	140	140	12.1	14.7	13.4	1,731	2,056	1,876
France	693	679	620	10.9	14.3	10.8	7,538	9,716	6,712
Spain	151	197	240	11.7	13.0	13.6	1,763	2,560	3,265
Italy	287	277	270	11.2	12.1	9.7	3,223	3,361	2,613
Germany	1,125	1,194	941	10.9	13.8	12.9	12,226	16,445	12,168
Austria	75	88	106	10.2	12.2	11.1	762	1,073	1,177
Czechoslovakia	608	614	441	10.1	11.5	11.7	6,121	7,078	5,144
Hungary	195	183	142	9.1	8.8	8.0	1,771	1,610	1,137
Yugoslavia	145	128	120	8.3	6.4	------	1,210	821	------
Rumania	122	113	50	8.1	8.3	------	984	935	------
Poland	590	457	380	9.3	11.4	------	5,479	5,200	------
Russia	1,905	2,825	3,694	3.6	5.9	5.1	6,887	16,721	18,739
Other[2]	75	78	65	7.6	8.9	------	572	691	------
Total countries reporting acreage and production, all years	6,421	7,692	7,857	------	------	------	56,062	78,592	66,538
Total, all countries reporting	7,353	8,468	8,472	------	------	------	64,307	86,239	------

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture.

[1] Preliminary. [2] Includes Irish Free State, Switzerland, Bulgaria, Latvia, Finland, and Australia.

TABLE 152.—*Beet sugar: Production, United States, 1911–1931*

Year[1]	Factories operating	Acreage from which beets were harvested[2]	Beets paid for by factories	Beets sliced	Sugar produced (chiefly refined)[3]	Analysis of beets		Recovery of sucrose from beets[6]		Sugar produced per ton of beets		Beet pulp produced	
						Purity coefficient[4]	Percentage of sucrose[5]	Paid for	Sliced	Paid for	Sliced	Molasses pulp	Dry pulp other than molasses pulp
	Number	*1,000 acres*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Lbs.*	*Lbs.*	*1,000 short tons*	*1,000 short tons*
1911	66	474	------	5,062	600	82.21	15.89	------	11.84	------	237	------	------
1912	73	555	------	5,224	693	84.49	16.31	------	13.26	------	265	------	------
1913	71	580	5,886	5,659	733	83.22	15.78	12.45	12.96	249	259	------	------
1914	60	483	5,585	5,288	722	83.89	16.38	12.93	13.65	259	273	------	------
1915	67	611	6,511	6,150	874	84.38	16.49	13.42	14.21	268	284	------	------
1916	74	665	6,228	5,920	821	84.74	16.30	13.18	13.86	264	277	------	------
1917	91	665	5,980	5,626	765	83.89	16.28	12.79	13.60	256	272	------	------
1918	89	594	5,949	5,578	761	84.70	16.18	12.79	13.64	256	273	------	------
1919	89	692	6,421	5,888	726	82.84	14.48	11.31	12.34	226	247	------	------
1920	97	872	8,538	7,991	1,089	83.96	15.99	12.75	13.63	255	273	------	------
1921	92	815	7,782	7,414	1,020	83.09	15.77	13.11	13.76	262	275	------	------
1922	81	530	5,183	4,963	675	83.76	15.44	13.02	13.61	260	272	------	------
1923	89	657	7,006	6,585	881	83.43	15.30	12.57	13.37	251	267	------	------
1924	90	817	7,513	7,075	1,090	85.03	17.19	14.51	15.41	290	308	------	------
1925	88	653	7,423	6,993	913	82.84	14.86	12.30	13.06	246	261	------	------
1926	78	687	7,300	6,782	897	84.03	14.94	12.29	13.23	246	265	74	78
1927	83	732	7,821	7,443	1,093	84.60	16.11	13.98	14.68	280	294	89	76
1928	82	646	7,111	6,880	1,061	85.52	16.73	14.92	15.42	298	308	64	75
1929	79	694	7,366	7,117	1,018	84.46	15.64	13.74	14.22	275	284	111	48
1930	77	783	9,262	8,789	1,208	83.79	15.22	13.00	13.70	260	274	150	60
1931[7]	------	720	7,936	------	1,117	------	15.97	13.83	------	277	------	------	------

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Year shown is that in which beets were grown. Sugar-making campaign extends into succeeding year.
[2] Including, in some years, a small acreage in Canada used by United States factories.
[3] Includes a small quantity not made from beets, and also that made at the Johnstown, Colo., molasses factory.
[4] Percentages of sucrose (pure sugar) in the total soluble solids of the beets.
[5] Based upon weight of beets sliced, except possibly in a very few factories.
[6] Sucrose actually extracted by factories (as percentage of weight of beets).
[7] Preliminary.

TABLE 153.—*Sugar: Production in continental United States, Hawaii, Porto Rico, and the Philippine Islands, 1909–10 to 1930–31*

Year beginning July	Total cane and beet sugar (refined) [1]	Beet sugar (chiefly refined)	Cane sugar (chiefly raw): Continental United States	Porto Rico	Hawaii	Philippine Islands	Total
	Short tons	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*
1909–10	1, 765, 011	512, 469	331, 726	346, 786	517, 090	[2] 140, 783	1, 336, 385
1910–11	1, 859, 946	510, 172	355, 040	349, 840	566, 821	168, 254	1, 439, 955
1911–12	2, 096, 658	599, 500	360, 874	371, 076	595, 038	268, 878	1, 595, 866
1912–13	2, 057, 179	692, 556	162, 573	398, 004	546, 524	345, 077	1, 452, 178
1913–14	2, 304, 454	733, 401	300, 538	351, 666	612, 000	408, 339	1, 672, 543
1914–15	2, 282, 021	722, 054	246, 620	346, 490	646, 000	421, 192	1, 660, 302
1915–16	2, 404, 018	874, 220	138, 620	483, 590	592, 763	412, 274	1, 627, 247
1916–17	2, 590, 239	820, 657	310, 900	503, 081	644, 663	425, 266	1, 883, 910
1917–18	2, 411, 263	765, 207	245, 840	453, 794	576, 700	474, 745	1, 751, 079
1918–19	2, 399, 820	760, 950	284, 400	406, 002	600, 312	453, 346	1, 744, 060
1919–20	2, 259, 514	726, 451	122, 125	485, 071	555, 727	466, 913	1, 629, 836
1920–21	2, 761, 304	1, 089, 021	176, 114	489, 818	521, 579	589, 437	1, 776, 948
1921–22	2, 769, 970	1, 020, 489	327, 701	408, 325	592, 000	533, 189	1, 861, 215
1922–23	2, 260, 865	675, 000	295, 735	379, 172	537, 000	475, 325	1, 687, 232
1923–24	2, 604, 292	881, 000	164, 823	447, 570	691, 000	529, 091	1, 832, 484
1924–25	3, 252, 954	1, 090, 000	88, 483	660, 411	769, 000	779, 510	2, 297, 404
1925–26	2, 923, 225	913, 000	139, 381	603, 240	787, 246	607, 362	2, 137, 229
1926–27	3, 019, 707	897, 000	47, 166	629, 134	811, 333	766, 902	2, 254, 535
1927–28	3, 468, 969	1, 093, 000	70, 792	748, 677	896, 918	807, 814	2, 524, 201
1928–29	3, 463, 853	1, 061, 000	132, 053	586, 761	899, 101	933, 954	2, 551, 869
1929–30	3, 806, 300	1, 018, 000	200, 000	866, 110	912, 357	983, 767	2, 962, 234
1930–31	3, 905, 315	1, 208, 000	184, 000	783, 163	[3] 915, 000	[3] 983, 100	2, 865, 263

Bureau of Agricultural Economics. Production data compiled from the following sources: United States from the Department of Agriculture, except cane sugar, 1909–10 and 1910–11, which are from Willet & Gray; Hawaii from Hawaiian Sugar Planters Association; Porto Rico and Philippines from official sources of those islands. Figures for earlier years appear in previous issues of the Yearbook.

[1] Cane sugar, raw, converted to refined basis by multiplying by the following factors: United States, 0.932; Porto Rico, 0.9393; Hawaii, 0.9358; Philippine Islands, 0.95.
[2] Exports.
[3] Unofficial.

TABLE 154.—*Cane sugar: Production of Hawaii, 1913–14 to 1930–31*

Year beginning October	Total acreage in cane	Cane used for sugar: Acreage harvested	Average yield per acre [1]	Production	Sugar produced: As made	Equivalent refined [2]	Sugar made per short ton of cane	Recovery of equivalent refined sugar from cane ground [3]
	Acres	*Acres*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Pounds*	*Per cent*
1913–14		112, 700	43	4, 900, 000	612, 000	573, 000	250	11. 69
1914–15	239, 800	113, 200	46	5, 185, 000	646, 000	605, 000	249	11. 67
1915–16	246, 332	115, 419	42	4, 859, 424	592, 763	554, 708	244	11. 42
1916–17	245, 100	123, 900	42	5, 220, 000	644, 663	603, 276	247	11. 56
1917–18	276, 800	119, 800	41	4, 855, 000	576, 700	539, 676	238	11. 12
1918–19	239, 900	119, 700	40	4, 744, 000	600, 312	561, 772	253	11. 84
1919–20	247, 900	114, 100	39	4, 473, 000	555, 727	520, 049	248	11. 63
1920–21	236, 500	113, 100	41	4, 657, 000	521, 579	488, 094	224	10. 48
1921–22	229, 000	124, 000	41	5, 088, 000	592, 000	554, 000	235	10. 89
1922–23	235, 000	114, 000	40	4, 560, 000	537, 000	503, 000	235	11. 03
1923–24	232, 000	111, 000	51	5, 661, 000	691, 000	647, 000	244	11. 43
1924–25	241, 000	122, 000	52	6, 297, 000	769, 000	720, 000	244	11. 43
1925–26	237, 774	122, 309	53	6, 495, 686	787, 246	736, 705	242	11. 34
1926–27	234, 809	124, 542	56	6, 992, 082	811, 333	759, 245	232	10. 86
1927–28	240, 769	131, 534	59	7, 707, 330	896, 918	839, 336	233	10. 89
1928–29	239, 858	129, 131	58	7, 447, 494	899, 101	841, 379	241	11. 30
1929–30	242, 761	133, 840	59	7, 853, 439	912, 357	853, 784	232	10. 87
1930–31	251, 533	137, 037	62	8, 485, 183	988, 612	925, 143	233	10. 90

Bureau of Agricultural Economics. Estimates of the crop-reporting board prior to 1926. Since then data collected through the Hawaiian Sugar Planters' Association.

[1] Age of cane equals 18 to 22 months of growth.
[2] 1 ton of sugar as made is assumed to be equivalent to 0.9358 tons of refined, as tentatively recommended by the joint committee on sugar statistics of the Department of Commerce and the Department of Agriculture.
[3] Based upon tonnage of cane used.

TABLE 155.—*Cane sugar: Production in Louisiana, 1911–1931*

Year [1]	Factories operating	Cane used for sugar: Acreage	Cane used for sugar: Average yield per acre [2]	Cane used for sugar: Production	Sugar produced: As made	Sugar produced: Equivalent refined [3]	Recovery of equivalent refined sugar from cane ground [4]	Sugar made per ton of cane	Molasses made: Total [5]	Molasses made: Per ton of sugar made	Molasses made: Per ton of cane used
	Number	*Acres*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Per cent*	*Pounds*	*Gallons*	*Gallons*	*Gallons*
1911	188	310, 000	19. 0	5, 887, 292	352, 874	328, 879	5. 59	120	35, 062, 525	99	6. 0
1912	126	197, 000	11. 0	2, 162, 574	153, 573	143, 130	6. 62	142	14, 302, 169	93	6. 6
1913	153	248, 000	17. 0	4, 214, 000	292, 698	272, 795	6. 47	139	24, 046, 320	82	5. 7
1914	149	213, 000	15. 0	3, 199, 000	242, 700	226, 200	7. 07	152	17, 177, 443	71	5. 4
1915	136	183, 000	11. 0	2, 018, 000	137, 500	128, 200	6. 35	135	12, 743, 000	93	6. 3
1916	150	221, 000	18. 0	4, 072, 000	303, 900	283, 200	6. 95	149	26, 154, 000	86	6. 4
1917	140	244, 000	15. 6	3, 813, 000	243, 600	227, 000	5. 95	128	30, 728, 000	126	8. 1
1918	134	231, 200	18. 0	4, 170, 000	280, 900	261, 800	6. 28	135	28, 049, 000	100	6. 7
1919	121	179, 900	10. 5	1, 883, 000	121, 000	112, 800	5. 99	129	12, 991, 000	107	6. 9
1920	122	182, 843	13. 6	2, 492, 524	169, 127	157, 626	6. 32	136	16, 856, 867	100	6. 8
1921	124	226, 366	18. 5	4, 180, 780	324, 431	302, 370	7. 23	155	25, 423, 341	78	6. 1
1922	112	241, 433	15. 6	3, 778, 110	295, 095	275, 029	7. 28	156	22, 718, 640	77	6. 0
1923	105	217, 259	11. 1	2, 386, 650	162, 023	151, 005	6. 33	136	15, 719, 400	97	6. 6
1924	82	163, 000	7. 6	1, 228, 000	88, 000	82, 000	6. 68	144	9, 590, 000	109	7. 8
1925	91	190, 000	14. 0	2, 645, 000	139, 000	130, 000	4. 91	105	17, 783, 000	128	6. 7
1926	54	128, 000	6. 8	864, 000	47, 000	44, 000	5. 09	109	6, 614, 000	141	7. 7
1927	46	73, 000	13. 4	962, 000	71, 000	66, 000	6. 86	147	6, 624, 000	93	6. 9
1928	55	115, 000	16. 2	1, 860, 000	132, 000	123, 000	6. 61	142	13, 535, 000	103	7. 3
1929	65	156, 000	18. 8	2, 918, 000	200, 000	186, 000	6. 37	137	19, 619, 000	98	6. 7
1930	61	149, 000	17. 1	2, 599, 000	184, 000	171, 000	6. 68	144	16, 887, 000	92	6. 6
1931 [6]	-------	154, 000	15. 0	2, 310, 000	156, 000	145, 000	6. 28	135	14, 322, 000	92	6. 2

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Sugar campaign, usually not ended before February following season of growth of cane.
[2] Age of cane equals one growing season of about 9 months.
[3] 1 ton of sugar as made is assumed to be equivalent to 0.932 tons of refined as tentatively recommended by the joint committee on sugar statistics of the Department of Commerce and the Department of Agriculture.
[4] Based upon tonnage of cane used.
[5] Figures for molasses, 1911–1914, are as reported by the Louisiana Sugar Planters' Association. Figures for later years as reported by Division of Crop and Livestock Estimates. For sirup production see Table 163.
[6] Preliminary.

TABLE 156.—*Sugar: Production in specified countries, average 1909–10 to 1913–14 and 1921–22 to 1925–26, and annual 1928–29 to 1931–32*

BEET SUGAR IN TERMS OF RAW SUGAR

Country	Average, 1909–10 to 1913–14[1]	Average, 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32[2]
	Short tons	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*
NORTH AMERICA						
Canada	11,782	31,908	36,735	39,432	53,764	[3] 53,000
United States	655,000	984,600	1,141,000	1,094,000	1,298,600	1,201,000
Total	666,782	1,016,508	1,177,735	1,133,432	1,352,364	1,254,000
EUROPE						
England and Wales	3,084	24,385	240,851	362,757	526,062	325,000
Scotland	(4)	(4)	1,836	713	1,758	
Irish Free State	(4)	(4)	24,295	25,557	23,390	8,800
Sweden	153,739	175,564	177,415	133,823	205,767	158,000
Denmark	127,091	142,726	179,014	140,874	175,656	138,000
Netherlands	246,341	324,273	346,849	286,170	317,958	193,000
Belgium	278,837	346,094	303,213	273,426	306,894	300,035
France	807,887	624,498	999,249	1,010,848	1,324,308	980,000
Spain	115,727	199,414	237,476	246,426	318,449	320,000
Italy	208,675	308,261	432,908	496,135	474,904	469,910
Switzerland	3,784	6,698	7,738	6,760	6,300	7,000
Germany	2,340,268	1,557,556	2,054,218	2,187,795	2,808,076	1,692,328
Austria	79,528	53,192	118,300	132,706	165,620	176,000
Czechoslovakia	1,221,274	1,178,534	1,164,525	1,141,638	1,258,614	874,021
Hungary	175,783	139,801	242,579	272,083	258,127	171,000
Yugoslavia	41,459	63,482	140,600	143,769	113,198	92,104
Bulgaria	4,376	22,044	30,071	40,800	60,205	24,600
Rumania	88,245	76,698	160,744	118,150	181,009	70,000
Poland	702,626	421,338	823,714	1,009,597	854,957	644,258
Latvia	(4)	(5)	1,797	3,888	8,322	10,747
Finland	(4)	1,407	3,315	2,790	4,267	4,400
Russia, European	1,557,114	474,700	1,413,000	907,000	1,914,364	2,012,000
Turkey	(4)	(4)	4,079	6,046	10,700	18,000
Total	8,155,838	6,140,665	9,107,786	8,949,751	11,318,905	8,689,203
ASIA						
Japan:						
Hokkaido	(6)	9,995	22,724	28,064	32,334	30,000
Chosen	(6)	625	709	733	1,007	1,000
Total	----------	10,620	23,433	28,797	33,341	31,000
OCEANIA						
Australia	1,030	3,021	2,348	3,186	3,752	2,200
World total, beet sugar[7]	8,823,650	7,170,814	10,311,302	10,115,166	12,708,362	9,976,403

CANE SUGAR (RAW)

Country	Average, 1909–10 to 1913–14[1]	Average, 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32[2]
NORTH AMERICA, CENTRAL AMERICA, AND WEST INDIES						
United States	302,150	203,224	132,053	199,609	183,693	155,925
Hawaii	567,495	675,249	899,101	912,357	[3] 915,000	[3] 915,300
Porto Rico	361,974	499,751	586,761	866,110	783,163	948,942
Virgin Islands	5,482	5,535	2,875	6,424	2,000	[3] 2,200
Central America:						
Guatemala	8,998	21,733	33,402	[3] 37,408	[3] 40,249	[3] 36,000
Nicaragua	3,742	14,457	[3] 10,000	16,000	----------	----------
Salvador	10,834	21,200	23,148	27,600	----------	----------
Mexico	163,388	179,150	201,831	[3] 235,000	289,591	[3] 224,000
West Indies (British):						
Antigua	12,919	13,340	[3] 12,258	[3] 20,776	[3] 9,000	[3] 16,000
Barbados	27,788	56,200	73,378	56,498	[3] 38,192	[3] 66,000
Jamaica	23,856	39,883	64,549	75,313	62,272	[3] 56,000
St. Christopher	13,252	13,985	15,371	19,753	16,766	[3] 17,000
Trinidad and Tobago	51,275	66,483	100,717	89,430	[3] 110,402	[3] 101,000

[1] Averages are for a 5-year period wherever available, otherwise for any year or years within this period. Figures for Europe are estimates of production in territory within present boundaries.
[2] Preliminary.
[3] Unofficial estimate.
[4] No sugar produced.
[5] Too small to report.
[6] Included with cane-sugar production in Japan.
[7] Exclusive of production in minor producing countries for which no statistics are available.

Table 156.—*Sugar: Production in specified countries, average 1909–10 to 1913–14 and 1921–22 to 1925–26, and annual 1928–29 to 1931–32*—Continued

CANE SUGAR (RAW)—Continued

Country	Average, 1909–10 to 1913–14	Average, 1921–22 to 1925–26	1928–29	1929–30	1930–31	1931–32
NORTH AMERICA, CENTRAL AMERICA, AND WEST INDIES—continued	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*
Cuba	2, 287, 052	4, 908, 638	5, 775, 179	5, 231, 490	3, 495, 292	[3] 3,360, 000
Dominican Republic	104, 664	281, 846	396, 575	403, 638	406, 237	424, 850
Haiti	(5)	10, 158	13, 996	[3] 21, 176	[3] 21, 068	[3] 20, 000
West Indies (French):						
Guadeloupe	40, 810	32, 674	[3] 2, 590	[3] 30, 144	[3] 27, 328	[3] 31, 000
Martinique	42, 782	33, 573	[3] 42, 056	[3] 42, 038	[3] 41, 328	[3] 44, 000
Total North American and Central American countries and West Indies reporting, all years	4, 013, 885	7, 041, 422	8, 352, 692	8, 247, 164	6, 441, 581	6, 418, 217
EUROPE AND ASIA						
Spain	17, 059	8, 738	14, 949	21, 007	27, 800	31, 400
India [8]	2, 649, 480	3, 247, 800	3, 035, 000	3, 092, 000	3, 559, 000	[3] 3,472, 000
Formosa	192, 299	471, 748	870, 077	893, 396	867, 561	996, 579
Japan	75, 718	91, 569	110, 532	106, 986	161, 723	[3] 206, 102
Java [9]	1, 512, 569	2, 113, 004	3, 197, 927	3, 245, 288	[3] 3,184, 000	[3] 2,688, 000
Philippine Islands	294, 380	584, 895	923, 954	983, 767	983, 000	----------
Total European and Asiatic countries reporting, all years	4, 447, 125	5, 932, 859	7, 228, 485	7, 358, 677	7, 800, 084	7, 394, 081
SOUTH AMERICA						
Argentina	193, 853	288, 008	412, 947	375, 310	420, 854	381, 124
Brazil	332, 813	904, 456	1, 066, 301	1, 124, 371	1, 008, 000	[3] 1,092, 000
British Guiana	112, 297	112, 297	130, 462	131, 324	143, 096	[3] 123, 000
Dutch Guiana	13, 235	12, 469	19, 883	14, 069	[3] 18, 500	[3] 16, 000
Ecuador	6, 289	17, 603	[3] 25, 370	[3] 21, 008	23, 208	[3] 22, 400
Peru	202, 518	354, 567	398, 741	472, 176	[3] 543, 286	[3] 576, 000
Venezeula	3, 187	21, 423	[3] 22, 000	[3] 25, 000	[3] 22, 000	[3] 20, 000
Total South America	864, 192	1, 710, 823	2, 075, 704	2, 163, 258	2, 178, 944	2, 230, 524
AFRICA						
Egypt	67, 127	100, 264	122, 026	118, 157	134, 260	[3] 106, 000
Mauritius	233, 671	243, 069	279, 360	262, 386	243, 564	[3] 196, 000
Union of South Africa	88, 165	182, 420	295, 934	298, 635	393, 000	329, 400
Portuguese East Africa	26, 460	53, 219	100, 786	104, 718	[3] 95, 000	[3] 95, 000
Reunion	41, 653	52, 015	42, 211	56, 243	55, 572	[3] 39, 000
Madagascar	(4)	2, 168	[3] 4, 894	5, 534	6, 724	9, 736
Total Africa	457, 076	633, 155	845, 211	845, 673	928, 120	775, 136
OCEANIA						
Australia	216, 331	411, 638	602, 083	602, 654	600, 992	[3] 650, 000
Fiji	84, 629	71, 984	[3] 110, 525	98, 236	104, 000	[3] 89, 000
Total Oceania	300, 960	483, 622	712, 608	700, 890	704, 992	739, 000
Total cane-sugar producing countries reporting all years	10, 083, 238	15, 801, 881	19, 214, 700	19, 315, 662	18, 053, 721	17, 556, 958
Estimated world total cane sugar [7]	10, 539, 000	16, 610, 000	20, 365, 000	20, 527, 000	19, 253, 000	18, 759, 000
Total world cane and beet sugar production in countries reporting all years	18, 906, 888	22, 972, 695	29, 526, 002	29, 430, 828	30, 762, 083	27, 533, 361
Estimated world total cane and beet sugar [7]	19, 363, 000	23, 781, 000	30, 676, 000	30, 642, 000	31, 961, 000	28, 735, 000

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture except as otherwise stated. Figures are for the crop years 1909-10 to 1931-32 for the countries in which the sugar-harvesting season begins in the fall months and is completed during the following calendar year, except in certain cane-sugar producing countries in the Southern Hemisphere, such as Argentina, Australia, Mauritius, Union of South Africa, etc., where the season begins in May or June and is completed in the same calendar year. Production in these countries is for the calendar years 1909 to 1931.

[3] Unofficial estimate.
[4] No sugar produced.
[5] Too small to report.
[7] Exclusive of production in minor producing countries for which no statistics are available.
[8] The figures quoted for India are for the production of gur, a low grade of sugar polarizing between 50° and 60°. Practically the entire crop is consumed within the country.
[9] All grades of sugar reduced to terms of head sugar, a grade of sugar which contains at least 96.5 per cent of sucrose. Figures for Java are for the calendar years 1910 to 1932.

Table 157.—*Sugar: Production, trade, and supply available for consumption in continental United States, 1909–10 to 1931–32*

IN TERMS OF RAW SUGAR

Year beginning July	Production [1]	Brought in from insular possessions [2]	Imports as sugar [3]	Domestic exports as sugar [4]	Exports in other forms [5]	Available for consumption [6] Total	Available for consumption [6] Per capita
	Short tons	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Pounds*
1909–10	882, 630	927, 752	1, 934, 754	72, 382	24, 351	3, 648, 403	79. 7
1910–11	903, 475	943, 701	1, 845, 279	36, 597	15, 966	3, 639, 891	78. 3
1911–12	1, 005, 337	1, 187, 663	1, 832, 424	50, 380	15, 160	3, 959, 883	83. 9
1912–13	907, 070	1, 026, 972	2, 266, 426	30, 963	19, 217	4, 150, 288	86. 6
1913–14	1, 088, 944	936, 376	2, 462, 252	37, 190	11, 892	4, 439, 489	91. 3
1914–15	1, 022, 828	1, 098, 314	2, 529, 963	302, 641	13, 585	4, 334, 878	87. 9
1915–16	1, 078, 407	1, 102, 057	2, 689, 067	882, 864	12, 213	3, 974, 453	79. 4
1916–17	1, 193, 107	1, 203, 938	2, 527, 984	676, 752	29, 211	4, 219, 066	83. 2
1917–18	1, 068, 437	975, 684	2, 344, 816	305, 429	46, 131	4, 037, 377	78. 5
1918–19	1, 102, 421	1, 073, 944	2, 799, 962	568, 566	36, 747	4, 371, 013	83. 8
1919–20	903, 060	975, 735	3, 812, 955	776, 502	98, 386	4, 816, 862	91. 1
1920–21	1, 346, 811	1, 076, 342	3, 228, 279	319, 589	89, 491	5, 242, 352	97. 6
1921–22	1, 424, 726	1, 340, 867	3, 940, 777	1, 085, 349	31, 397	5, 589, 624	102. 4
1922–23	1, 021, 360	1, 235, 049	4, 068, 205	412, 196	12, 568	5, 899, 849	106. 5
1923–24	1, 111, 898	1, 274, 870	3, 436, 955	152, 883	24, 617	5, 646, 223	100. 2
1924–25	1, 260, 000	1, 645, 319	3, 931, 282	273, 470	22, 436	6, 540, 695	114. 2
1925–26	1, 121, 000	1, 981, 482	3, 895, 947	325, 804	24, 998	6, 647, 627	114. 4
1926–27	1, 011, 000	1, 689, 347	3, 968, 997	124, 555	26, 303	6, 518, 486	110. 6
1927–28	1, 246, 000	2, 051, 659	3, 415, 830	115, 566	29, 833	6, 568, 090	110. 1
1928–29	1, 273, 000	1, 974, 899	4, 115, 601	139, 324	31, 894	7, 192, 282	119. 0
1929–30	1, 294, 000	2, 377, 787	2, 823, 173	87, 092	43, 320	6, 364, 548	103. 3
1930–31	1, 482, 000	2, 603, 733	2, 416, 400	77, 131	33, 026	6, 391, 976	103. 0
1931–32	1, 357, 000						

IN TERMS OF REFINED SUGAR [7]

Year beginning July	Production [1]	Brought in from insular possessions [2]	Imports as sugar [3]	Domestic exports as sugar [4]	Exports in other forms [5]	Available for consumption [6] Total	Available for consumption [6] Per capita
1921–22	1, 325, 906	1, 260, 894	3, 686, 397	1, 009, 377	29, 182	5, 234, 638	95. 9
1922–23	950, 625	1, 166, 351	3, 805, 745	383, 439	11, 682	5, 522, 600	99. 7
1923–24	1, 034, 615	1, 198, 777	3, 214, 883	142, 217	22, 943	5, 283, 115	93. 7
1924–25	1, 172, 000	1, 547, 587	3, 674, 563	254, 391	20, 911	6, 118, 848	106. 8
1925–26	1, 043, 000	1, 859, 332	3, 634, 323	303, 073	23, 298	6, 210, 284	106. 8
1926–27	941, 000	1, 588, 981	3, 714, 054	115, 865	24, 514	6, 103, 656	103. 6
1927–28	1, 159, 000	1, 930, 732	3, 196, 443	107, 704	27, 805	6, 150, 666	103. 1
1928–29	1, 184, 000	1, 858, 331	3, 851, 311	129, 846	29, 726	6, 734, 070	111. 4
1929–30	1, 204, 000	2, 239, 140	2, 641, 709	81, 167	40, 375	5, 963, 307	96. 8
1930–31	1, 379, 000	2, 451, 609	2, 261, 189	71, 884	30, 781	5, 989, 133	96. 5
1931–32	1, 262, 000						

Bureau of Agricultural Economics. Trade figures from the Bureau of Foreign and Domestic Commerce.

[1] Beet and cane sugar only.
[2] Duty free, from Hawaii, Porto Rico, and the Philippine Islands (Virgin Islands included 1917 and subsequently).
[3] No account taken of sugar imported in other forms. Imports from the Philippine Islands excluded, reexports deducted.
[4] Shipments to Hawaii and Porto Rico included. Direct exports to foreign countries from Hawaii and Port Rico excluded.
[5] Sugar used in the manufacture of other commodities for export on which drawback was paid.
[6] No account taken of stocks at the beginning or end of year.
[7] Raw sugar converted to refined by multiplying by the following factors: Cuba and Hawaii, 0.9358; Porto Rico, 0.9393; Philippines, 0.95; all others (Santo Domingo, British West Indies, Louisiana, etc.), 0.932.

TABLE 158.—*Sugar, raw, cane and beet: World production, 1909–10 to 1931–32*

Crop year [1]	Estimated world total	Estimated world total cane sugar	Estimated world total beet sugar	Production in selected countries							
				United States [2]	Cuba	India [3]	Java [4]	Germany [5]	Czechoslovakia	Poland [6]	France [7]
	1,000 short tons	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*
1909–10	16,828	9,670	7,158	883	2,021	2,481	1,411	2,147			861
1910–11	18,834	9,870	8,964	903	1,661	2,587	1,617	2,770			763
1911–12	17,908	10,622	7,286	1,005	2,124	2,745	1,550	1,552			546
1912–13	20,542	10,896	9,646	907	2,720	2,862	1,616	2,902			1,029
1913–14	21,154	11,640	9,514	1,089	2,909	2,573	1,549	2,886			841
1914–15	20,875	11,952	8,923	1,023	2,922	2,736	1,454	2,721		376	355
1915–16	18,885	12,278	6,607	1,078	3,398	2,949	1,797	1,678		239	159
1916–17	18,592	13,255	5,337	1,193	3,422	3,093	2,009	1,721		293	217
1917–18	20,293	14,790	5,503	1,068	3,890	3,839	1,960	1,726		263	235
1918–19	18,604	14,076	4,528	1,102	4,491	2,752	1,473	1,297	[8] 714	249	129
1919–20	17,989	14,338	3,651	903	4,184	3,404	1,681	774	553	106	182
1920–21	19,546	14,225	5,321	1,347	4,406	2,825	1,853	1,195	797	195	358
1921–22	20,578	15,095	5,483	1,425	4,517	2,928	1,994	1,434	731	170	326
1922–23	20,860	15,127	5,733	1,022	4,083	3,410	1,981	1,604	811	335	522
1923–24	22,810	16,306	6,504	1,112	4,606	3,715	2,201	1,263	1,115	423	524
1924–25	26,670	17,712	8,958	1,260	5,812	2,852	2,535	1,724	1,574	540	919
1925–26	27,989	18,813	9,176	1,120	5,524	3,334	2,175	1,763	1,662	638	831
1926–27	26,624	18,125	8,499	1,011	5,050	3,659	2,639	1,834	1,153	634	786
1927–28	28,515	18,671	9,844	1,246	4,527	3,603	3,238	1,846	1,383	658	956
1928–29	30,676	20,365	10,311	1,273	5,775	3,035	3,198	2,054	1,165	824	999
1929–30	30,642	20,527	10,115	1,294	5,231	3,092	3,245	2,188	1,142	1,010	1,011
1930–31 [9]	31,961	19,253	12,708	1,482	3,495	3,559	[10] 3,184	2,808	1,259	855	1,324
1931–32 [9]	28,735	18,759	9,976	1,357	[10] 3,360	[10] 3,472	[10] 2,688	[10] 1,692	874	644	980

Bureau of Agricultural Economics. Estimated world total sugar production for the period 1895–96 to 1908–09 in Agricultural Yearbook, 1924, p. 808.

[1] Figures are for the crop years 1909–10 to 1930–31 for the countries in which the sugar production season begins in the fall months and is completed during the following calendar year, except in certain cane-sugar producing countries where the season begins in May or June and is completed in the same calendar year. Production in these countries is for the calendar years 1909 to 1930.
[2] Production of cane and beet sugar in terms of raw sugar.
[3] The figures quoted for India are for the production of gur, a low grade of sugar polarizing between 50° and 60°. Practically the entire crop is consumed within the country.
[4] All grades of sugar reduced to terms of head sugar, a grade of sugar which contains at least 96.5 per cent sucrose. Figures for Java are for the calendar years 1910–1932.
[5] Figures for 1909–10 to 1917–18 are for pre-war boundaries.
[6] Figures are incomplete through 1920–21; 1914–15 includes Prussian Poland only; 1915–16 to 1919–20 include Prussian Poland and Congress Poland; 1920–21 includes Prussian Poland, Congress Poland, and Galicia.
[7] Figures for 1909–10 to 1918–19 refer to pre-war boundaries; 1914–15 to 1918–19 are exclusively of invaded territory.
[8] Bohemia, Moravia, and Silesia only.
[9] Preliminary.
[10] Unofficial estimate.

TABLE 159.—*Sugar, raw (96° centrifugal): Average wholesale price per pound, New York, 1922–1931* [1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average [2]
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922	3.6	3.8	3.9	4.0	4.1	4.6	5.2	5.2	4.8	5.4	5.6	5.7	4.7
1923	5.3	6.2	7.3	7.8	7.9	7.4	6.9	6.1	7.0	7.6	7.3	7.3	7.0
1924	6.7	7.2	6.9	6.4	5.6	5.1	5.1	5.4	6.0	6.0	5.8	5.3	6.0
1925	4.6	4.6	4.7	4.5	4.3	4.4	4.3	4.4	4.3	3.9	4.0	4.1	4.3
1926	4.2	4.2	4.0	4.1	4.2	4.1	4.2	4.2	4.4	4.6	4.7	5.1	4.3
1927	5.1	4.9	4.8	4.8	4.8	4.6	4.5	4.5	4.8	4.7	4.7	4.6	4.7
1928	4.5	4.3	4.5	4.5	4.5	4.3	4.2	4.1	4.2	3.9	3.9	3.9	4.2
1929	3.8	3.7	3.7	3.7	3.6	3.5	3.8	3.8	4.0	4.0	3.8	3.8	3.8
1930	3.7	3.7	3.6	3.5	3.2	3.2	3.3	3.2	3.1	3.3	3.4	3.3	3.4
1931	3.4	3.3	3.3	3.3	3.2	3.3	3.5	3.5	3.4	3.4	3.4	3.2	3.3

Bureau of Agricultural Economics. Compiled from Bureau of Labor Statistics reports. Data for 1890–1921 are available in 1924 Yearbook, p. 810, Table 388.

[1] Quotations are on basis of duty paid.
[2] Derived from the figures upon which the monthly averages are based.

TABLE 160.—*Sugar: International trade, average 1925–1929, annual 1927–1930*

Country	Calendar year							
	Average, 1925–1929		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*
Cuba	5,048,092	525	4,389,253	135	5,543,887	79	3,642,624	37
Dutch East Indies	2,380,762	3,634	2,827,302	3,772	2,680,686	3,825	[2] 2,468,929	[2] 335
Czechoslovakia	792,566	628	819,545	77	595,686	109	571,962	3,332
Philippine Islands	612,260	2,398	628,242	4,887	767,055	2,138	820,089	1,046
Dominican Republic	353,915	196	383,664	17	355,574	7	386,621	6
Peru	332,668	106	337,270	24	400,553	107	---	373,441
Poland	253,202	2,291	204,675	38	328,309	11,087	435,378	11,977
Mauritius	242,199	[3] 3	241,695	[3] 3	306,259	[3] 2	---	---
Australia [3]	179,533	911	232,667	33	216,394	27	---	---
Germany	174,357	92,758	85,161	138,113	242,455	30,826	328,458	18,876
Belgium	152,463	77,894	109,906	86,349	128,509	88,820	79,012	74,797
British Guiana	113,607	447	128,449	536	112,503	361	128,287	192
Russia	105,024	57,858	150,348	2	139,719	40,086	---	342,155
Fiji	92,836	171	135,165	172	80,948	290	101,896	193
Hungary	90,488	417	78,013	594	133,851	862	117,780	722
Union of South Africa	82,951	10,307	90,389	17,977	122,740	19,867	183,482	10,126
Trinidad and Tobago	72,520	1,564	83,006	2,056	91,284	1,607	77,435	1,010
Barbados	61,494	0	70,178	0	73,379	0	56,497	0
Reunion	54,035	26	[3] 39,516	[3] 132	[3] 41,447	[3] 0	---	---
Jamaica	49,676	1,081	54,562	1,102	41,866	1,373	---	---
Mozambique	37,906	93	40,060	377	55,299	14	---	---
Brazil	25,076	20	33,116	3	16,400	0	93,097	4
Argentina	23,426	17,264	37,775	1,246	10,034	1,979	4,699	5,083
Madagascar	3,897	3,768	4,659	3,960	5,500	4,237	4,784	3,618
Total	11,334,953	274,360	11,204,616	261,605	12,490,337	207,703	9,501,030	846,950
PRINCIPAL IMPORTING COUNTRIES								
United States	167,360	4,428,566	122,587	3,868,804	102,639	4,888,389	77,814	3,495,113
United Kingdom	105,263	2,146,493	83,825	2,150,189	186,766	2,351,404	312,589	2,136,360
British India	40,084	904,568	44,761	930,251	42,962	1,034,939	48,487	1,014,270
China	2,072	823,225	1,542	916,132	665	959,428	252	812,404
Canada	89,914	524,446	27,555	477,711	20,799	475,490	13,906	472,706
France	251,691	460,753	282,929	488,067	331,458	562,430	308,767	452,644
Japan	204,509	414,134	258,084	423,395	217,615	251,020	244,568	269,693
Netherlands	284,204	316,951	227,232	307,109	122,542	188,931	106,270	198,641
Switzerland	74	148,736	85	158,532	97	163,479	188	166,365
Chile	133	136,205	200	149,113	159	168,181	---	125,938
British Malaya	31,068	125,180	32,135	125,176	21,297	128,229	15,585	126,473
Morocco	0	121,576	0	128,314	0	146,913	0	142,492
Austria	663	114,983	617	118,737	685	123,377	558	89,632
Sweden	18	110,608	18	103,528	55	158,566	90	94,037
Irish Free State	0	92,080	0	90,115	0	88,518	0	92,108
Finland	0	87,238	0	101,485	0	101,349	0	134,417
Portugal	102	86,255	105	94,066	80	78,784	---	---
Persia [4]	99	82,505	9	84,399	8	100,175	---	---
New Zealand	739	81,102	867	89,497	1,062	78,665	1,222	96,579
Norway	0	79,493	0	80,109	0	83,705	0	93,041
Egypt	9,341	79,282	5,704	77,881	7,256	107,974	5,146	143,326
Italy	6,616	68,519	4	118,438	9,192	23,499	14,361	20,700
Greece	[5] 12	64,751	23	67,075	---	69,765	---	70,499
Algeria	65	63,358	[3] 21	70,785	[3] 68	75,502	---	81,298
Ceylon	1	61,046	0	69,030	[3] 1	72,242	---	80,102
Siam [6]	1,648	46,472	243	44,164	39	49,447	---	52,873
Latvia	20	41,655	[3] 0	46,559	70	45,689	---	45,874
Uruguay	0	41,575	0	37,338	0	41,103	---	---
Denmark	3,148	29,841	605	43,603	626	42,862	183	50,315
Tunis	0	29,742	0	31,841	0	37,478	0	41,334
Lithuania	9	25,731	[3] 26	27,501	[3] 18	29,796	---	34,418
Anglo-Egyptian Sudan	0	23,812	0	26,766	0	32,976	0	34,442
Formosa	13,346	18,109	8,744	8,374	2,967	1,642	---	---
Yugoslavia	4,654	7,320	0	16,108	14,655	3,102	8,858	2,072
Gold Coast	0	5,584	0	6,704	0	5,994	---	---
Total	1,216,853	11,891,894	1,097,921	11,576,896	1,083,781	12,771,043	1,158,844	10,670,166

Bureau of Agricultural Economics. Official sources except where otherwise noted. The following kinds and grades have been included under the head of sugar: Brown, white, candied, caramel, chancaca (Peru), crystal cube, maple, muscovado, panela. The following have been excluded: "Candy" (meaning confectionery), confectionery, glucose, grape sugar, jaggery, molasses, and sirups.

[1] Preliminary.
[2] Java and Madura only.
[3] International Yearbook of Agricultural Statistics.
[4] Year ended Mar. 20 of following year.
[5] 2-year average.
[6] Year ended Mar. 31 of following year.

TABLE 161.—*Sugar, granulated: Average retail price per pound, United States, 1922–1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922	6.2	6.4	6.5	6.7	6.6	7.1	7.6	8.1	7.9	7.9	8.1	8.3	7.3
1923	8.3	8.7	10.2	10.6	11.2	11.1	10.5	9.6	9.6	10.6	10.3	10.4	10.1
1924	10.2	10.3	10.4	9.9	9.2	8.3	8.4	8.2	8.6	8.8	8.8	8.8	9.2
1925	8.1	7.7	7.7	7.5	7.2	7.2	7.1	7.0	7.0	6.8	6.6	6.7	7.2
1926	6.7	6.7	6.7	6.6	6.7	6.9	6.9	7.0	7.0	7.1	7.1	7.3	6.9
1927	7.5	7.5	7.4	7.3	7.3	7.3	7.4	7.3	7.2	7.2	7.2	7.1	7.3
1928	7.1	7.1	7.1	7.1	7.2	7.3	7.3	7.1	7.0	6.9	6.8	6.7	7.1
1929	6.7	6.6	6.5	6.4	6.4	6.4	6.4	6.6	6.7	6.7	6.7	6.6	6.6
1930	6.6	6.5	6.4	6.3	6.3	6.1	6.1	6.1	5.9	5.8	5.9	5.9	6.2
1931	5.9	5.9	5.8	5.7	5.6	5.6	5.6	5.7	5.7	5.6	5.6	5.5	5.7

Bureau of Agricultural Economics. Compiled from Bureau of Labor Statistics retail prices. Data for 1913–1921 available in 1930 Yearbook, p. 704, Table 162.

TABLE 162.—*Sorgo sirup: Acreage, production, and December 1 price, by States, 1928–1931*

State	Acreage used for sirup				Average yield per acre				Production				Price per gallon received by producers			
	1928	1929	1930	1931 [1]	1928	1929	1930	1931	1928	1929	1930	1931 [1]	1928	1929	1930	1931
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Gals.*	*Gals.*	*Gals.*	*Gals.*	*1,000 gals.*	*1,000 gals.*	*1,000 gals.*	*1,000 gals.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Indiana	2	2	2	3	96	66	47	65	192	132	94	195	115	110	110	60
Illinois	9	2	2	2	72	65	51	72	648	130	102	144	110	110	110	67
Iowa	3	3	2	3	120	111	100	90	360	333	200	270	115	115	115	87
Missouri	22	9	10	12	85	55	45	55	1,870	495	450	660	100	105	100	62
Kansas	2	1	2	4	75	60	40	50	150	60	80	200	100	95	100	71
Virginia	12	2	2	3	86	61	40	70	1,032	122	80	210	95	95	95	67
North Carolina	20	15	22	29	86	70	60	73	1,720	1,050	1,320	2,117	90	85	80	53
South Carolina	18	5	7	9	72	52	50	54	1,296	260	350	486	80	80	75	48
Georgia	24	11	12	16	80	65	62	61	1,920	715	744	976	90	90	70	43
Kentucky	42	12	12	18	72	55	40	70	3,024	660	480	1,260	95	100	90	49
Tennessee	29	19	18	28	78	60	48	65	2,262	1,140	864	1,820	95	95	90	40
Alabama	30	22	31	54	75	63	65	75	2,250	1,386	2,015	4,050	90	85	70	32
Mississippi	30	17	14	25	80	81	68	88	2,400	1,377	952	2,200	80	75	60	30
Arkansas	40	12	12	20	70	46	38	70	2,800	552	456	1,400	90	95	85	40
Oklahoma	15	4	1	10	70	36	25	45	1,050	144	25	450	85	85	85	45
Texas	32	14	16	23	83	50	44	60	2,656	700	704	1,380	80	85	75	49
United States	330	150	165	259	77.7	61.7	54.0	68.8	25,630	9,256	8,916	17,818	90.4	89.7	78.7	43.0

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.

TABLE 163.—*Sugarcane sirup: Acreage, production, and December 1 price, by States, 1928–1931*

State	Acreage used for sirup				Average yield per acre				Production				Price per gallon received by producers			
	1928	1929	1930	1931 [1]	1928	1929	1930	1931	1928	1929	1920	1931 [1]	1928	1929	1930	1931
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Gals.*	*Gals.*	*Gals.*	*Gals.*	*1,000 gals.*	*1,000 gals.*	*1,000 gals.*	*1,000 gals.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
South Carolina	6	5	5	5	125	118	118	80	750	590	590	400	90	90	80	60
Georgia	29	29	28	28	140	165	130	100	4,060	4,785	3,640	2,800	75	75	60	50
Florida	8	10	9	9	180	186	170	165	1,440	1,860	1,530	1,485	85	85	65	50
Alabama	16	18	18	20	117	117	120	93	1,872	2,106	2,160	1,860	95	90	80	55
Mississippi	18	17	15	14	200	191	120	150	3,600	3,247	1,800	2,100	90	85	70	55
Arkansas	2	1	1	1	120	106	54	140	240	106	54	140	110	110	100	69
Louisiana	20	17	22	20	334	340	282	252	6,679	5,773	6,208	5,045	55	46	36	39
Texas	11	7	6	7	160	124	142	147	1,760	868	852	1,029	110	105	95	70
United States	110	104	104	104	185.5	185.9	161.9	142.9	20,401	19,335	16,834	14,859	77.6	72.7	57.7	49.3

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.

TABLE 164.—*Maple sugar and sirup: Production in important States, 1917–1931* [1]

Year	Trees tapped	Sugar made	Sirup made	Total product in terms of sugar [2]	Average total product per tree: As sugar [2]	Average total product per tree: As sirup [2]	Average price received by producers: Per pound of sugar	Average price received by producers: Per gallon of sirup
	1,000 trees	*1,000 pounds*	*1,000 gallons*	*1,000 pounds*	*Pounds*	*Gallons*	*Cents*	*Dollars*
1917	17, 313	10, 525	4, 258	44, 589	2. 58	0. 32		
1918	19, 132	12, 944	4, 863	51, 848	2. 71	. 34		
1919	18, 799	9, 787	3, 804	40, 219	2. 14	. 27		
1920	18, 895	7, 324	3, 580	35, 964	1. 90	. 24		
1921	15, 114	4, 730	2, 386	23, 818	1. 58	. 20		
1922	16, 274	5, 147	3, 640	34, 267	2. 11	. 26		
1923	15, 291	4, 685	3, 605	33, 525	2. 19	. 27		
1924	15, 407	4, 078	3, 903	35, 302	2. 29	. 29	0. 26	2. 02
1925	15, 313	3, 236	3, 089	27, 946	1. 82	. 23	. 27	2. 10
1926	14, 712	3, 569	3, 737	33, 465	2. 27	. 28	. 29	2. 16
1927	14, 603	3, 133	3, 671	32, 501	2. 23	. 28	. 29	2. 09
1928	14, 388	2, 317	3, 007	26, 373	1. 83	. 23	. 29	2. 05
1929	12, 906	1, 344	2, 346	20, 112	1. 56	. 19	. 30	2. 03
1930	13, 113	2, 430	3, 635	31, 510	2. 40	. 30	. 30	2. 02
1931 [3]	12, 218	1, 653	2, 157	18, 909	1. 55	. 19	. 26	1. 72

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[1] The data for 1917–1923 include 11 States: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, Pennsylvania, Ohio, Indiana, Michigan, and Wisconsin; data for 10 States, excluding Connecticut, are shown for 1924 and 1925; and data from 9 States, excluding Indiana, are shown from 1926 to 1931. In 1919 the 9 States now included produced about 97 per cent of the maple sugar and about 92 per cent of the maple sirup, as reported by the Bureau of the Census.
[2] 1 gallon of sirup taken as equivalent to 8 pounds of sugar.
[3] Preliminary.

TABLE 165.—*Maple sugar and sirup: Production by States, 1928–1931*

State	Trees tapped				Sugar made				Sirup made			
	1928	1929	1930	1931 [1]	1928	1929	1930	1931 [1]	1928	1929	1930	1931 [1]
	1,000 trees	*1,000 trees*	*1,000 trees*	*1,000 trees*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 gallons*	*1,000 gallons*	*1,000 gallons*	*1,000 gallons*
Maine	304	255	255	255	3	24	40	9	38	40	38	26
New Hampshire	806	378	382	390	274	109	154	78	137	88	93	56
Vermont	5, 722	5, 535	5, 646	5, 194	1, 133	690	1, 195	830	1, 038	1, 090	1, 368	578
Massachusetts	280	268	268	252	134	37	110	34	67	44	80	43
New York	3, 647	3, 613	3, 682	3, 229	549	298	613	324	718	613	1, 120	577
Pennsylvania	607	913	905	848	67	105	212	190	157	133	350	202
Ohio	1, 583	1, 208	1, 214	1, 256	58	39	55	96	480	205	368	440
Michigan	869	493	503	508	70	34	39	73	208	79	146	156
Wisconsin	570	243	258	286	29	8	12	19	164	54	72	79
9 States	14, 388	12, 906	13, 113	12, 218	2, 317	1, 344	2, 430	1, 653	3, 007	2, 346	3, 635	2, 157

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[1] Preliminary.

TABLE 166.—*Honey: Monthly average price in producing sections and at consuming markets, 1921–1930*

EXTRACTED HONEY, PER POUND

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
CALIFORNIA WHITE TO WATER WHITE ORANGE												
F. o. b. southern California shipping points: [1]	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1927	------	7¾	9	8¾	8	8¼	8¾	9	9¼	9½	9½	10
1928	10	10	10	9½	8¾	8¾	9	9¼	9¼	9½	9¾	9½
1929	9¾	9¾	9½	9½	10	10¼	11	11¼	11	11	12	------
1930	12¾	12½	13½	10½	8¼	8	7½	7½	7¼	7½	7½	7¾
1931	7¼	7⅛	7¼	6⅜	6½	6¼	6¼	6⅜	6¼	6½	6⅜	6½
New York City: [2]												
1927	12½	12½	11	------	11	11¼	11½	12¾	13	12¾	13	13
1928	------	------	------	------	12½	12½	12½	12½	12¾	13	12¾	12½
1929	12½	12½	12½	12½	12½	12½	12½	12¾	13	13½	13½	13½
1930	13½	13½	13½	13½	------	12¼	12¼	12⅜	12⅝	12½	12¼	12
1931	11¾	11½	11¼	11	11	10½	10½	10½	11	11	10¼	10⅜
INTERMOUNTAIN WHITE TO WATER WHITE SWEET CLOVER AND ALFALFA												
F. o. b. intermountain points: [3]												
1927	6¾	6½	6	5¾	5¾	6	6	6¾	7	7½	7¾	7¼
1928	7¼	7½	7¼	7¼	7¼	7	7¼	7	7¼	7¼	7	7
1929	7⅛	7⅛	7⅜	7⅝	7¾	7½	7	7⅜	7¼	7⅛	7¼	7⅛
1930	7¼	7¼	7	6⅞	6½	5¾	6¼	6½	5¾	5½	5⅜	5¾
1931	5¼	5½	5½	5⅛	4⅞	4⅝	5⅛	5⅛	5⅛	5	5⅛	4⅞
WHITE CLOVER												
F. o. b. New York and North Central States: [4]												
1927	10¼	10	9½	9½	9¼	8¾	8½	9	8½	8½	8¾	8½
1928	8½	8¼	8	8	8	8½	9¼	9	8¾	8½	9	8½
1929	8¾	8¾	9	9¼	8¾	9	9½	8¾	8½	8¼	8¼	8
1930	8¼	8¼	8¼	8¼	8⅛	7¾	7¾	8	7¾	7¼	7⅜	7½
1931	7⅜	6⅞	6¾	6¾	6¾	6⅞	6¾	6¾	6⅝	7	6⅝	6⅜
NORTHEASTERN BUCKWHEAT												
F. o. b. New York and Pennsylvania points: [4]												
1927	8¼	7	7¼	------	8½	------	------	8	7½	7¼	7¼	7½
1928	7¼	7¼	7¼	6¾	------	------	------	8	7¾	7½	7½	7¼
1929	7¾	7½	7	7¼	7½	7½	------	8½	7⅞	8	7⅝	7¼
1930	7¾	6½	6¾	7⅜	------	7	------	8	6½	6½	5½	6
1931	------	5¾	5⅜	5¾	------	------	5½	------	5	5	5	5

COMB HONEY, 24-SECTION CASES

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
WHITE CLOVER COMB, NO. 1 AND FANCY												
F. o. b. New York and North Central States: [4]	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1927	4.50	5.25	5.25	5.25	------	5.00	5.00	4.75	4.25	4.75	4.50	4.80
1928	4.80	4.80	4.50	4.80	4.50	4.25	4.50	4.50	4.50	4.50	4.80	4.50
1929	4.80	4.50	4.25	4.25	4.50	4.25	4.50	4.50	4.25	4.00	4.00	4.00
1930	4.25	4.00	4.00	4.00	4.25	4.00	4.00	4.25	4.25	4.00	4.00	3.75
1931	3.80	3.75	3.60	3.40	3.25	3.50	3.50	3.60	3.75	3.50	3.50	3.40

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[1] Price to beekeepers or other shippers in car lots to July, 1923; thereafter, price in large lots, mostly less than car lots.
[2] Sales by original receivers to bottlers, confectioners, bakers, and jobbers.
[3] Price to beekeepers and other shippers, in car lots.
[4] Price to beekeepers in large lots mostly less than car lots.

TABLE 167.—*Tobacco, unmanufactured: Acreage, production, value, exports, etc., United States, 1890-1931*

Year	Acreage	Average yield per acre	Production	Price per pound received by producers Dec. 1	Farm value, basis Dec. 1, farm price	Domestic exports, year beginning July [1]	Imports, year beginning July [1]	Net exports, year beginning July [1 2]
	Acres	*Lbs.*	*1,000 lbs.*	*Cts.*	*1,000 dolls.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
1890	722,028	722.8	518,683	8.3	42,846	249,233	23,255	227,254
1891	738,216	747.4	551,777	8.5	47,074	255,432	21,989	234,587
1892	720,189	687.6	495,209	9.3	46,044	266,083	28,110	239,153
1893	702,952	687.1	483,024	8.1	39,155	290,685	19,663	272,983
1894	523,103	777.4	406,678	6.8	27,761	300,992	26,668	276,223
1895	633,950	775.4	491,544	7.2	35,574	295,539	32,925	266,317
1896	594,749	677.6	403,004	6.0	24,258	314,932	13,805	302,847
1897	[3] 945,604	646.0	610,860			263,020	10,477	254,907
1898	[3] 933,868	748.0	698,533			283,613	14,036	271,559
1899	*1,101,460*	*788.1*	*868,113*					
1899	1,101,500	728.5	802,397	7.1	57,273	344,656	19,620	326,939
1900	1,046,427	778.2	814,345	6.6	53,661	315,788	26,851	290,915
1901	1,039,199	788.0	818,953	7.1	58,283	301,007	29,429	273,770
1902	1,030,734	797.3	821,824	7.0	57,564	368,184	34,017	337,902
1903	1,037,735	786.3	815,972	6.8	55,515	311,972	31,163	286,335
1904	806,409	819.0	660,461	8.1	53,383	334,302	33,288	304,694
1905	776,112	815.6	633,034	8.5	53,519	312,227	41,126	273,912
1906	796,099	857.2	682,429	10.0	68,233	340,743	40,899	302,506
1907	820,800	850.5	698,126	10.2	71,411	330,813	35,005	297,657
1908	875,425	820.2	718,061	10.3	74,130	287,901	43,123	247,155
1909	*1,294,911*	*815.3*	*1,055,765*					
1909	1,294,900	814.8	1,055,133	10.1	106,374	357,196	46,838	313,085
1910	1,366,100	807.7	1,103,415	9.3	102,142	355,327	48,203	309,171
1911	1,013,000	893.7	905,109	9.4	85,210	379,845	54,740	327,199
1912	1,226,000	785.5	962,855	10.8	104,063	418,797	67,977	353,575
1913	1,216,100	784.3	953,734	12.8	122,481	449,750	61,175	391,196
1914	1,223,500	845.7	1,034,679	9.8	101,411	348,346	45,809	306,426
1915	1,369,900	775.4	1,062,237	9.1	96,281	443,293	48,078	400,624
1916	1,413,400	816.0	1,153,278	14.7	169,672	411,599	49,105	370,987
1917	1,517,800	823.1	1,249,276	24.0	300,449	289,171	86,991	211,962
1918	1,647,100	873.7	1,439,071	28.0	402,264	629,288	83,951	577,323
1919	*1,864,080*	*736.6*	*1,372,993*					
1919	1,951,000	751.1	1,465,481	39.0	570,868	648,038	94,005	570,858
1920	1,960,000	807.3	1,582,225	21.2	335,675	506,526	58,923	456,477
1921	1,427,000	749.6	1,069,693	19.9	212,728	463,389	65,225	403,492
1922	1,695,000	735.6	1,246,837	23.2	289,248	454,364	73,796	386,213
1923	1,877,000	807.2	1,515,110	19.9	301,096	597,630	52,380	550,404
1924	*1,537,843*	*719.4*	*1,106,340*					
1924	1,705,800	733.6	1,251,343	20.7	259,139	430,702	75,131	357,478
1925	1,757,300	783.3	1,376,628	18.2	250,774	537,240	68,281	470,651
1926	1,656,400	783.6	1,297,889	18.2	236,702	516,402	91,089	426,545
1927	1,584,900	764.7	1,211,909	21.2	256,882	489,996	79,112	413,299
1928	1,894,100	725.7	1,374,547	[4] 20.2	277,506	565,925	76,891	491,542
1929	1,987,300	773.5	1,537,193	[4] 18.6	286,104	600,181	63,181	541,312
1930	2,101,100	778.3	1,635,210	[4] 12.9	211,102	591,020	75,426	517,372
1931 [5]	2,019,600	797.2	1,610,098	[4] 9.7	156,097			

Bureau of Agricultural Economics. Italic figures are census returns, other acreage, yield, and production figures are estimates of the crop-reporting board. See p. 970, 1927 Yearbook, for data for earlier years.

[1] Compiled from Commerce and Navigation of the United States, 1890-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States; June issues 1919-1926, January and June issues, 1927-1931, and official records of the Bureau of Foreign and Domestic Commerce.
[2] Total exports (domestic exports plus foreign) minus imports.
[3] Revised on basis of 1899.
[4] Season average price; for 1931 based on sales previous to Dec. 15.
[5] Preliminary.

TABLE 168.—*Tobacco: Acreage and production, by States, average 1924–1928, annual 1928–1931*

State	Acreage					Production				
	Average 1924–1928	1928	1929	1930	1931 [1]	Average 1924–1928	1928	1929	1930	1931 [1]
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
Mass	7, 760	7, 600	8, 200	8, 300	7, 600	10, 061	9, 462	11, 898	11, 728	10, 184
Conn	25, 800	25, 000	20, 800	23, 400	22, 500	33, 511	29, 750	28, 496	32, 409	29, 295
N. Y.	1, 360	800	900	900	900	1, 570	1, 020	1, 012	855	1, 170
Pa	38, 200	37, 000	40, 500	41, 300	40, 900	50, 856	49, 580	51, 232	39, 854	58, 487
Ohio	44, 980	40, 500	51, 000	48, 100	54, 000	37, 175	32, 198	40, 953	45, 695	53, 622
Ind	15, 760	13, 700	19, 600	17, 400	17, 400	13, 531	11, 234	16, 072	12, 458	16, 060
Wis	33, 400	37, 000	38, 500	43, 000	40, 000	38, 868	48, 100	48, 125	52, 890	47, 200
Minn		1, 000	1, 500	2, 300	1, 900		1, 200	1, 800	2, 875	2, 185
Mo	4, 600	4, 000	5, 200	6, 200	8, 100	4, 377	4, 400	4, 732	5, 679	8, 505
Md	31, 200	31, 000	33, 000	35, 000	38, 000	24, 369	20, 460	24, 750	16, 625	31, 540
Va	191, 360	180, 800	178, 000	186, 000	163, 000	127, 153	104, 864	119, 794	112, 530	106, 276
W. Va	7, 660	6, 800	7, 400	6, 300	7, 200	6, 053	5, 100	5, 513	3, 906	5, 328
N. C	599, 200	728, 000	736, 000	766, 000	689, 000	407, 697	499, 408	487, 968	585, 990	468, 520
S. C	105, 400	148, 000	118, 000	116, 000	98, 000	66, 469	82, 288	87, 084	98, 600	70, 070
Ga	72, 540	122, 300	98, 000	114, 000	84, 000	52, 552	84, 387	89, 670	104, 538	59, 640
Fla	7, 960	12, 000	10, 700	10, 900	9, 100	6, 715	9, 216	9, 630	9, 756	7, 598
Ky	413, 640	388, 000	486, 000	519, 000	586, 000	330, 997	300, 700	392, 688	372, 123	506, 890
Tenn	117, 680	109, 600	134, 000	157, 000	152, 000	89, 846	80, 775	115, 776	126, 699	127, 528
La	1, 000	1, 000				422	405			
U. S	1, 719, 700	1, 894, 100	1, 987, 300	2, 101, 100	2, 019, 600	1, 302, 463	1, 374, 547	1, 537, 193	1, 635, 210	1, 610, 098

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.

TABLE 169—*Tobacco: Acreage, yield, and production, by types, 1930 and 1931*

Class and type	Type No.	Harvested acreage		Yield per acre		Production		Price per pound	
		1930	1931 [1]	1930	1931	1930	1931 [1]	1930 [2]	1931 [3]
		1,000 acres	*1,000 acres*	*Lbs.*	*Lbs.*	*1,000, pounds*	*1,000 pounds*	*Cts.*	*Cts.*
Flue-cured:									
Old belt	11	421. 0	366. 5	699	629	294, 094	230, 701	11. 0	8. 5
Virginia	11	133. 0	106. 5	572	579	76, 078	61, 701	7. 9	7. 6
North Carolina	11	288. 0	260. 0	757	650	218, 016	169, 000	12. 0	8. 9
Eastern North Carolina belt	12	414. 0	370. 0	763	688	315, 882	254, 697	13. 4	9. 4
South Carolina belt	13	172. 8	149. 2	841	732	145, 292	109, 238	12. 4	10. 0
North Carolina	13	56. 8	51. 2	822	765	46, 692	39, 168	13. 2	11. 5
South Carolina	13	116. 0	98. 0	850	715	98, 600	70, 070	12. 0	9. 2
Georgia and Florida belt	14	120. 2	89. 0	907	709	109, 008	63, 079	10. 0	6. 4
Georgia	14	112. 9	83. 0	914	707	103, 233	58, 720	9. 9	6. 4
Florida	14	7. 3	6. 0	791	726	5, 775	4, 359	10. 4	7. 0
Total, flue-cured	11–14	1, 128. 0	974. 7	766	675	864, 276	657, 715	12. 0	8. 9
Fire-cured:									
Virginia	21	38. 0	41. 0	614	750	23, 325	30, 750	8. 3	5. 1
Clarksville and Hopkinsville	22	128. 5	126. 9	753	808	96, 805	102, 498	10. 4	6. 7
Kentucky	22	54. 5	52. 9	690	800	37, 605	42, 320	7. 5	5. 5
Tennessee	22	74. 0	74. 0	800	813	59, 200	60, 178	12. 3	7. 6
Paducah	23	55. 5	63. 0	685	842	38, 033	53, 075	5. 7	4. 9
Kentucky	23	48. 0	55. 0	686	845	32, 948	46, 475	5. 3	4. 8
Tennessee	23	7. 5	8. 0	678	825	5, 085	6, 600	8. 2	5. 5
Henderson stemming (Ky)	24	12. 0	12. 8	745	855	8, 940	10, 944	6. 9	5. 0
Total, fire-cured	21–24	234. 0	243. 7	714	809	167, 103	197, 267	8. 9	5. 9
Air-cured (light):									
Burley	31	470. 7	528. 8	738	879	347, 297	464, 955	15. 4	10. 9
Ohio	31	17. 0	20. 4	760	954	12, 920	19, 458	13. 8	10. 9
Indiana	31	13. 8	13. 8	678	923	9, 356	12, 734	10. 1	9. 3
Missouri	31	6. 2	8. 1	916	1, 050	5, 679	8, 505	15. 4	11. 0
Virginia	31	9. 2	9. 5	1, 060	950	9, 750	9, 025	17. 1	10. 0
West Virginia	31	6. 3	7. 2	620	740	3, 906	5, 328	16. 8	11. 5
North Carolina	31	7. 2	7. 8	750	725	5, 400	5, 655	15. 8	11. 0
Kentucky	31	340. 0	396. 0	709	875	241, 000	346, 500	15. 0	10. 9
Tennessee	31	71. 0	66. 0	835	875	59, 286	57, 750	18. 0	11. 0
Southern Maryland	32	35. 0	38. 0	475	830	16, 625	31, 540	29. 0	24. 0
Total, air-cured (light)	31–32	505. 7	566. 8	720	876	363, 922	496, 495	16. 0	11. 7

[1] Preliminary. [2] Season average price. [3] Based on sales previous to Dec. 15.

TABLE 169.—*Tobacco: Acreage, yield, and production, by types, 1930, and 1931*—Continued

Class and type	Type No.	Harvested acreage 1930	Harvested acreage 1931	Yield per acre 1930	Yield per acre 1931	Production 1930	Production 1931	Price per pound 1930	Price per pound 1931
		1,000 acres	*1,000 acres*	*Lbs.*	*Lbs.*	*1,000 pounds*	*1,000 pounds*	*Cts.*	*Cts.*
Air-cured (dark):									
One sucker	35	36.4	35.3	807	852	29,388	30,060	7.0	5.1
Indiana	35	3.4	3.4	850	943	2,890	3,206	6.0	12.0
Kentucky	35	28.5	27.9	820	855	23,370	23,854	7.0	4.0
Tennessee	35	4.5	4.0	695	750	3,128	3,000	8.2	6.5
Green River (Ky.)	36	36.0	41.4	785	889	28,260	36,797	8.9	4.5
Virginia sun-cured	37	5.8	6.0	582	800	3,377	4,800	7.7	6.0
Total, air-cured (dark)	35–37	78.2	82.7	780	866	61,025	71,657	7.9	4.9
Cigar filler:									
Pennsylvania Seedleaf	41	40.9	40.5	964	1,431	39,428	57,955	6.4	10.0
Miami Valley	42–44	30.5	32.6	1,061	1,007	32,347	32,844	10.1	7.5
Ohio	42–44	30.3	32.4	1,061	1,010	32,135	32,724	10.1	7.5
Indiana	42–44	.2	.2	1,060	600	212	120	9.0	9.2
Georgia and Florida Sun-grown	45	1.3	1.2	1,151	882	1,496	1,058	20.0	15.0
Georgia	45	.6	.5	1,175	870	705	435	20.0	15.0
Florida	45	.7	.7	1,130	890	791	623	20.0	15.0
Total, cigar filler	41–45	72.7	74.3	1,008	1,236	73,271	91,857	8.3	9.2
Cigar binder:									
Connecticut Valley Broadleaf	51	12.4	13.2	1,495	1,410	18,540	18,613	25.1	17.1
Massachusetts	51	.5	.5	1,500	1,412	750	706	25.0	17.0
Connecticut	51	11.9	12.7	1,495	1,410	17,790	17,907	25.1	17.1
Connecticut Valley Havana Seed	52	11.9	11.1	1,503	1,367	17,885	15,173	21.9	15.0
Massachusetts	52	6.4	6.0	1,490	1,400	9,536	8,400	21.0	15.0
Connecticut	52	5.5	5.1	1,518	1,328	8,349	6,773	23.0	15.0
New York and Pennsylvania Havana Seed	53	1.3	1.3	985	1,309	1,281	1,702	11.7	11.7
New York	53	.9	.9	1,000	1,300	855	1,170	12.0	11.5
Pennsylvania	53	.4	.4	1,065	1,330	426	532	11.0	12.0
Southern Wisconsin	54	23.2	23.1	1,256	1,221	29,130	28,200	9.8	8.0
Northern Wisconsin	55	22.1	18.8	1,205	1,127	26,635	21,185	10.3	8.1
Wisconsin	55	19.8	16.9	1,200	1,124	23,760	19,000	10.2	8.0
Minnesota	55	2.3	1.9	1,250	1,150	2,875	2,185	10.5	8.5
Total, cigar binder	51–55	70.9	67.5	1,318	1,257	93,471	84,873	15.3	11.3
Cigar wrapper:									
Connecticut Valley Shade-grown	61	7.4	5.8	1,042	982	7,712	5,693	90.0	80.0
Massachusetts	61	1.4	1.1	1,030	980	1,442	1,078	90.0	80.0
Connecticut	61	6.0	4.7	1,045	982	6,270	4,615	90.0	80.0
Georgia and Florida Shade-grown	62	3.4	2.9	1,115	1,069	3,790	3,101	60.0	50.0
Georgia	62	.5	.5	1,200	970	600	485	60.0	50.0
Florida	62	2.9	2.4	1,100	1,090	3,190	2,616	60.0	50.0
Total, cigar wrapper	61–62	10.8	8.7	1,065	1,011	11,502	8,794	80.1	69.5
Miscellaneous (eastern Ohio)		.8	1.2	800	1,200	640	1,440	5.9	6.6
United States	All	2,101.1	2,019.6	778.3	797.2	1,635,210	1,610,098	12.9	9.7

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

TABLE 170.—*Tobacco: Acreage, yield per acre, and production in specified countries, annual 1929–30 to 1931–32*

Country	Acreage			Yield per acre			Production		
	1929–30	1930–31	1931–32 [1]	1929–30	1930–31	1931–32	1929–30	1930–31	1931–32 [1]
North America, Central America, and West Indies:	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Lbs.*	*Lbs.*	*Lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
Canada	36	41	-----	823	887	-----	29,886	36,713	48,230
United States [2]	1,987	2,101	2,020	774	778	797	1,537,193	1,635,210	1,610,098
Mexico	42	35	[3] 35	683	701	699	28,511	24,198	[3] 24,118
Cuba	150	-----	-----	457	-----	-----	68,649	82,117	-----
Dominican Republic	-----	-----	-----	-----	-----	-----	44,974	24,030	-----
Porto Rico	39	43	-----	630	623	-----	24,603	26,786	-----
Europe:									
Sweden	1	1	-----	1,632	1,857	-----	1,233	1,344	-----
Belgium	7	7	7	2,020	2,113	1,820	15,035	15,387	12,739
France	37	-----	-----	1,717	-----	-----	62,903	-----	-----
Spain	7	12	-----	1,578	1,481	-----	10,377	17,415	-----
Italy	95	108	-----	1,122	1,010	-----	106,164	108,772	-----
Germany	24	23	26	2,136	2,025	2,060	50,924	46,408	[3] 46,311
Czechoslovakia	16	18	22	1,282	1,242	1,263	20,207	22,095	27,778
Hungary	55	58	-----	1,199	1,293	-----	65,802	75,372	-----
Yugoslavia	38	38	-----	802	827	-----	30,406	31,398	-----
Greece	250	195	[3] 196	607	783	504	151,540	152,658	98,767
Bulgaria	94	78	77	772	678	711	72,261	52,825	54,784
Rumania	76	85	-----	759	623	-----	57,315	53,011	-----
Poland	16	12	-----	1,200	1,078	-----	19,638	13,080	-----
Russia	240	248	406	1,099	1,231	-----	263,516	305,183	-----
North Africa:									
Algeria	53	57	40	834	758	507	44,560	43,485	20,283
Tunis	1	1	-----	881	881	-----	925	925	-----
Tripolitania	-----	1	1	-----	1,543	1,323	-----	1,543	1,323
Asia:									
Turkey [4]	120	73	-----	611	681	-----	73,044	49,879	-----
Iraq	8	14	-----	1,489	1,054	-----	12,376	14,560	-----
Palestine	5	-----	-----	551	-----	-----	2,632	-----	-----
Syria and Lebanon	9	10	21	696	696	576	6,512	6,967	12,092
India	1,359	[5] 1,172	-----	993	-----	-----	1,349,215	1,404,330	-----
Ceylon	14	-----	-----	649	-----	-----	8,818	-----	-----
Indo-China	[6] 33	[7] 21	-----	[6] 731	[7] 772	-----	24,212	[8] 16,890	-----
Japan	88	89	91	1,542	1,631	1,712	136,211	145,173	155,757
Chosen (Korea)	48	35	[3] 37	1,190	955	-----	57,180	33,291	-----
Taiwan (Formosa)	2	2	-----	1,512	1,637	-----	3,326	3,316	-----
Siam	25	-----	-----	373	-----	-----	9,180	-----	-----
Philippine Islands	204	198	-----	512	514	-----	104,539	101,662	-----
South America:									
Brazil	-----	-----	-----	-----	-----	-----	194,521	-----	-----
Chile	8	-----	-----	1,673	-----	-----	13,306	-----	-----
Argentina	30	-----	-----	974	-----	-----	29,277	-----	-----
South Africa:									
Union of South Africa	-----	-----	-----	-----	-----	-----	[9] 13,250	[3] 13,700	[3] 10,250
Southern Rhodesia	[10] 10	16	26	558	527	541	[10] 5,844	8,493	14,056
Northern Rhodesia	[10] 4	-----	-----	378	-----	-----	[10] 1,355	-----	-----
Nyasaland	52	43	-----	266	372	-----	13,822	15,990	[3] 16,000
Madagascar	23	32	-----	801	579	-----	18,651	18,519	-----
Oceania:									
Java and Madura [11]	69	80	-----	959	826	-----	65,745	66,290	-----
Sumatra [3]	52	50	-----	824	825	-----	42,693	41,317	-----
Australia	2	-----	-----	641	-----	-----	1,382	-----	-----
Total, all countries reporting acreage or production all years	2,868	2,912	3,004	-----	-----	-----	2,125,756	2,219,302	2,151,263
Estimated world total, exclusive of China [12]	-----	-----	-----	-----	-----	-----	5,007,000	-----	-----

Bureau of Agricultural Economics. Compiled from official sources and International Institute of Agriculture except as otherwise stated. Acreage and production figures are for the harvesting season. In the Northern Hemisphere data for 1930–31, for example, are for crops harvested in the summer and fall of 1930; in the Southern Hemisphere they are for crops harvested in the spring of 1931, except in the Dutch East Indies, where the harvest was largely completed in 1930.

[1] Preliminary.
[2] Revised December, 1931, on basis of 1930 census returns.
[3] Unofficial estimate.
[4] Turkey in Europe and in Asia.
[5] British Provinces only.
[6] Exclusive of Laos.
[7] Exclusive of Laos and Cambodia.
[8] Exclusive of Cambodia.
[9] Data for European plantations only.
[10] Cultivation by Europeans.
[11] Estate production only.
[12] No data are available for total production of China, which is of considerable importance.

TABLE 171.—*Tobacco: Yield per acre and estimated price per pound, December 1, by States, averages, and annual 1926–1931*

State	Yield per acre							Estimated price per pound						
	Av., 1919–1928	1926	1927	1928	1929	1930	1931	Av., 1925–1929	1926	1927	1928[1]	1929[1]	1930[1]	1931[1]
	Lbs.	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Massachusetts	1,344	1,448	1,223	1,245	1,451	1,413	1,340	32.7	35.0	35.7	34.1	41.6	29.7	22.0
Connecticut	1,341	1,340	1,223	1,190	1,370	1,385	1,302	35.3	35.6	36.6	37.2	48.1	37.1	26.5
New York	1,190	1,100	1,200	1,275	1,124	950	1,300	18.8	19.0	18.0	19.3	15.5	12.0	11.5
Pennsylvania	1,359	1,320	1,360	1,340	1,265	965	1,430	12.9	10.5	13.0	14.0	12.0	6.4	10.0
Ohio	869	846	819	795	803	950	993	16.3	10.1	18.4	22.0	16.0	11.1	8.7
Indiana	860	884	760	820	820	716	923	18.1	9.7	22.0	24.0	16.9	9.1	9.8
Wisconsin	1,187	1,150	1,070	1,300	1,250	1,230	1,180	15.2	13.8	16.0	14.6	15.0	10.0	8.0
Minnesota	-----	-----	-----	1,200	1,200	1,250	1,150	-----	-----	-----	12.0	14.5	10.5	8.5
Missouri	974	950	1,100	1,100	910	916	1,050	22.9	15.0	22.0	28.6	21.9	15.4	11.0
Maryland	773	840	818	660	750	475	830	24.0	23.7	23.0	27.3	27.7	29.0	24.0
Virginia	662	725	723	580	673	605	652	16.9	17.6	17.8	16.0	17.6	8.8	7.0
West Virginia	786	850	775	750	745	620	740	20.7	13.1	24.5	26.8	20.5	16.8	11.5
North Carolina	645	684	737	686	663	765	680	21.8	26.4	22.0	19.5	18.5	12.9	9.4
South Carolina	656	668	737	556	738	850	715	17.9	23.3	20.5	12.7	15.5	12.0	9.2
Georgia	658	770	725	690	915	917	710	18.1	24.0	19.4	13.2	18.7	10.3	6.8
Florida	933	968	935	768	900	895	835	32.8	37.8	34.8	29.1	32.2	27.4	22.5
Kentucky	816	842	697	775	808	717	865	18.1	10.6	21.4	25.0	17.6	12.2	9.0
Tennessee	758	781	780	737	864	807	839	17.7	10.5	21.4	21.2	18.6	14.7	9.0
Louisiana	441	400	400	405	-----	-----	-----	46.0	45.0	45.0	45.0	-----	-----	-----
United States	764.2	783.6	764.7	725.7	773.5	778.3	797.2	19.3	18.2	21.2	20.2	18.6	12.9	9.7

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Season average price; for 1931 based on sales previous to Dec. 15.

TABLE 172.—*Tobacco: Production, stocks, supply, disappearance, and price, 1927–1931* [1]

FLUE-CURED, TYPES 11–14

Year	Production [2]	Stocks on hand July 1	Total supply	Disappearance, year beginning July 1 [2]	Average price per pound	Year	Production [2]	Stocks on hand July 1	Total supply	Disappearance, year beginning July 1 [2]	Average price per pound
	Million pounds	*Million pounds*	*Million pounds*	*Million pounds*	*Cents*		*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Cents*
1927	715.9	466.5	1,182.4	617.4	21.3	1930	864.3	599.3	1,463.6	786.8	12.0
1928	740.8	565.0	1,305.8	715.8	17.7	1931	[3] 657.7	676.8	1,334.5	--------	[3] 8.9
1929	749.8	590.0	1,339.8	740.5	18.0						

VIRGINIA FIRE-CURED, TYPE 21

Year	Production [2]	Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1 [2]	Average price per pound	Year	Production [2]	Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1 [2]	Average price per pound
	Million pounds	*Million pounds*	*Million pounds*	*Million pounds*	*Cents*		*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Cents*
1927	26.6	56.1	82.7	33.7	9.9	1930	23.3	27.9	51.2	22.6	8.3
1928	21.9	49.0	70.9	39.6	10.6	1931	[3] 30.8	28.6	59.4	--------	[3] 5.1
1929	22.8	31.3	54.1	26.2	16.9						

Bureau of Agricultural Economics. Stock prior to 1929 compiled from reports of the Bureau of the Census.

[1] Production and price data, 1929–1931, revised December, 1931, on basis of 1930 census returns.
[2] Green weight basis, i. e., farmers' sales weight. Disappearance includes consumption, exports, and losses.
[3] Estimated December, 1931.

TABLE 172.—*Tobacco: Production, stocks, supply, disappearance, and price, 1927–1931*—Continued

KENTUCKY AND TENNESSEE FIRE-CURED, TYPES 22 AND 23

Year	Production [2]	Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1 [2]	Average price per pound: Clarksville and Hopkinsville	Average price per pound: Paducah	Year	Production [2]	Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1 [2]	Average price per pound: Clarksville and Hopkinsville	Average price per pound: Paducah
	Million pounds	*Million pounds*	*Million pounds*	*Million pounds*	*Cents*	*Cents*		*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Cents*	*Cents*
1927	81.0	161.9	242.9	128.8	18.5	12.2	1930	134.8	107.1	241.9	112.7	10.4	5.7
1928	104.2	114.1	218.3	114.2	15.6	12.7	1931	[3] 155.6	129.2	284.8	-------	[3] 6.7	[3] 4.9
1929	155.0	104.1	259.1	152.0	14.2	10.0							

HENDERSON FIRE-CURED, TYPE 24

Year	Production [2]	Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1 [2]	Average price per pound	Year	Production [2]	Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1 [2]	Average price per pound
	Million pounds	*Million pounds*	*Million pounds*	*Million pounds*	*Cents*		*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Cents*
1927	4.2	7.2	11.4	6.8	9.7	1930	8.9	0.7	9.6	6.5	6.9
1928	6.0	4.6	10.6	9.9	12.0	1931	[3] 10.9	3.1	14.0	--------	[3] 5.0
1929	9.5	.7	10.2	9.5	9.5						
				BURLEY, TYPE 31							
1927	180.2	451.3	631.5	283.7	26.0	1930	347.3	373.0	720.3	283.5	15.4
1928	270.6	347.8	618.4	286.0	30.4	1931	[3] 465.0	436.8	901.8	--------	[3] 10.9
1929	342.2	332.4	674.6	301.6	21.8						
				SOUTHERN MARYLAND, TYPE 32							
1927	26.2	21.9	48.1	23.0	23.4	1930	16.6	17.2	33.8	11.7	29.0
1928	20.5	25.1	45.6	26.6	27.2	1931	[3] 31.5	22.1	53.6	--------	[3] 24.0
1929	24.8	19.0	43.8	26.6	27.7						
				ONE-SUCKER, TYPE 35							
1927	13.1	41.7	54.8	27.9	10.6	1930	29.4	25.1	54.5	22.2	7.0
1928	20.1	26.9	47.0	25.6	12.2	1931	[3] 30.1	32.3	62.4	--------	[3] 5.1
1929	29.9	21.4	51.3	26.2	10.5						
				GREEN RIVER, TYPE 36							
1927	18.1	48.4	66.5	26.4	9.1	1930	28.3	23.8	52.1	27.9	8.9
1928	18.9	40.1	59.0	28.2	11.6	1931	[3] 36.8	24.2	61.0	--------	[3] 4.5
1929	27.4	30.8	58.2	34.4	10.7						
				VIRGINIA SUN-CURED, TYPE 37							
1927	5.5	5.9	11.4	6.3	13.1	1930	3.4	3.9	7.3	3.8	7.7
1928	5.0	5.1	10.1	4.6	10.1	1931	[3] 4.8	3.5	8.3	--------	[3] 6.0
1929	4.1	5.5	9.6	5.7	13.2						

[2] Green weight basis, i. e., farmers' sale weight. Disappearance includes consumption, exports, and losses.
[3] Estimated December, 1931.

TABLE 172.—*Tobacco: Production, stocks, supply, disappearance, and price, 1927–1931*—Continued

PENNSYLVANIA CIGAR LEAF, TYPES 41 AND 53[4]

Year	Production	Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct 1	Average price per pound	Year	Production	Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1	Average price per pound
	Million pounds	*Million pounds*	*Million pounds*	*Million pounds*	*Cents*		*Million pounds*	*Million pounds*	*Million pounde*	*Million pounds*	*Cents*
1927	46.2	84.1	130.3	45.7	13.0	1930	39.9	80.1	120.0	44.9	6.4
1928	49.6	84.6	134.2	49.9	14.0	1931	[3] 58.5	75.1	133.6	--------	[3] 10.0
1929	51.2	84.3	135.5	54.8	12.0						

MIAMI VALLEY, TYPES 42–44

1927	16.6	56.8	73.4	26.5	15.6	1930	32.3	36.4	68.7	14.5	10.1
1928	20.1	46.9	67.0	27.1	17.5	1931	[3] 32.8	54.2	87.0	--------	[3] 7.5
1929	20.7	39.9	60.6	24.2	13.8						

NEW ENGLAND BROADLEAF, TYPE 51

1927	15.0	37.7	52.7	21.3	21.0	1930	18.5	24.8	43.3	13.4	25.1
1928	14.2	31.4	45.6	14.6	21.0	1931	[3] 18.6	29.9	48.5	--------	[3] 17.1
1929	12.1	31.0	43.1	18.3	27.4						

NEW ENGLAND HAVANA SEED, TYPES 52 AND 65

Year	Production[2]		Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1[2]	Average price per pound		Year	Production[2]		Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1[2]	Average price per pound	
	Primed Havana seed	Havana seed				Primed Havana seed	Havana seed		Primed Havana seed	Havana seed				Primed Havana seed	Havana seed
	Million lbs.	*Million lbs.*	*Million lbs.*	*Million lbs.*	*Million lbs.*	*Cents*	*Cents*		*Million lbs.*	*Million lbs.*	*Million lbs.*	*Million lbs.*	*Million lbs.*	*Cents*	*Cents*
1927	0.7	15.6	42.4	58.7	21.8	30.0	23.4	1930	------	17.9	32.9	50.8	17.4	------	21.9
1928	.6	17.5	36.9	55.0	23.6	30.0	24.0	1931	------	[3] 15.2	33.4	48.6	------	------	[3] 15.0
1929	.3	17.8	31.4	49.5	16.6	34.9	31.1								

WISCONSIN CIGAR LEAF, TYPES 54 AND 55

Year	Production[2]	Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1[2]	Average price per pound	Year	Production[2]	Stock on hand Oct. 1	Total supply	Disappearance, year beginning Oct.1[2]	Average price per pound
	Million pounds	*Million pounds*	*Million pounds*	*Million pounds*	*Cents*		*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Cents*
1927	33.2	83.1	116.3	43.8	16.0	1930	55.8	85.3	141.1	35.9	10.0
1928	49.3	72.5	121.8	35.1	14.5	1931	[3] 49.4	105.2	154.6	--------	[3] 8.0
1929	49.9	86.7	136.6	51.3	15.0						

[2] Green weight basis, i. e., farmers' sale weight. Disappearance includes consumption, exports, and losses.

[3] Estimated December, 1931.

[4] Does not include New York Havana seed.

TABLE 173.—*Tobacco: Stocks in hands of dealers and manufacturers, first of each quarter, 1927–1931*

Type and year	Jan. 1	Apr. 1	July 1	Oct. 1
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Flue-cured, types 11, 12, 13, and 14:				
1927	628, 574	556, 787	466, 476	580, 670
1928	756, 535	678, 958	564, 989	661, 817
1929	766, 370	703, 396	589, 978	669, 070
1930	795, 484	707, 149	599, 262	687, 769
1931	868, 983	831, 347	676, 752	739, 356
Virginia fire-cured, type 21:				
1927	53, 065	73, 510	65, 052	56, 140
1928	57, 000	64, 931	59, 409	49, 040
1929	47, 633	49, 092	38, 216	31, 268
1930	34, 997	40, 021	35, 625	27, 917
1931	33, 392	38, 364	33, 241	28, 607
Kentucky and Tennessee fire-cured, types 22 and 23:				
1927	132, 340	198, 465	186, 791	161, 939
1928	150, 328	168, 012	143, 883	114, 120
1929	105, 902	140, 420	133, 719	104, 131
1930	106, 860	158, 623	146, 855	107, 056
1931	100, 551	154, 404	155, 546	129, 349
Henderson fire-cured (stemming), type 24:				
1927	6, 145	11, 190	9, 987	7, 242
1928	7, 694	8, 390	5, 314	4, 583
1929	3, 446	2, 859	1, 288	711
1930	2, 794	5, 089	2, 291	736
1931	3, 788	8, 519	4, 212	3, 102
Burley, type 31:				
1927	469, 811	586, 337	518, 363	451, 251
1928	438, 267	475, 508	411, 095	347, 827
1929	354, 772	465, 941	396, 541	332, 382
1930	352, 803	506, 378	438, 659	373, 032
1931	407, 557	568, 010	500, 042	436, 802
Southern Maryland, type 32:				
1927	18, 699	12, 447	12, 523	21, 899
1928	15, 314	10, 848	12, 104	25, 132
1929	20, 245	13, 134	13, 293	18, 982
1930	15, 304	11, 960	9, 553	17, 167
1931	17, 038	14, 615	11, 756	22, 109
One-sucker, type 35:				
1927	46, 601	59, 143	48, 245	41, 668
1928	38, 813	39, 815	32, 399	26, 882
1929	28, 067	37, 666	26, 496	21, 374
1930	29, 852	38, 218	30, 283	25, 123
1931	29, 180	48, 357	41, 026	32, 324
Green River, type 36:				
1927	54, 161	63, 115	54, 683	48, 447
1928	47, 878	49, 127	43, 722	40, 127
1929	41, 122	35, 968	35, 670	30, 756
1930	30, 824	35, 618	28, 533	23, 786
1931	27, 369	29, 308	26, 136	24, 242
Virginia sun-cured, type 37:				
1927	5, 482	7, 966	7, 236	5, 925
1928	6, 504	7, 558	6, 347	5, 052
1929	4, 422	7, 915	6, 073	5, 492
1930	4, 941	5, 820	4, 935	3, 878
1931	3, 855	4, 709	4, 142	3, 455
Pennsylvania cigar leaf, types 41 and 53:				
1927	89, 708	113, 551	95, 539	84, 067
1928	71, 516	106, 646	95, 466	84, 649
1929	72, 424	-------	-------	-------
Pennsylvania seedleaf, type 41:				
1929	-------	115, 639	93, 861	83, 306
1930	73, 186	93, 795	90, 292	79, 592
1931	68, 790	80, 387	83, 011	74, 200
Ohio cigar leaf (Miami Valley), types 42, 43, and 44:				
1927	62, 490	72, 037	64, 386	56, 774
1928	48, 420	60, 696	55, 515	46, 875
1929	38, 868	55, 392	47, 094	39, 888
1930	34, 502	41, 448	42, 282	36, 427
1931	30, 502	54, 389	58, 455	54, 181
Georgia-Florida cigar leaf, sun and shade types 45 and 62:				
1927	4, 088	3, 190	1, 876	4, 879
1928	4, 461	4, 019	2, 618	7, 081
1929	5, 994	-------	-------	-------
Georgia and Florida sun-grown, type 45:				
1929	-------	1, 174	803	2, 078
1930	1, 538	1, 319	1, 340	2, 345
1931	2, 033	2, 223	1, 530	2, 419
Porto Rico cigar leaf, type 46:				
1927	18, 577	17, 639	13, 746	16, 588
1928	21, 426	23, 646	21, 172	20, 067
1929	22, 230	26, 128	25, 142	25, 270
1930	29, 039	28, 442	24, 734	23, 510
1931	27, 284	27, 932	24, 940	23, 546
New England broad leaf type 51:				
1927	40, 278	46, 483	45, 925	37, 709
1928	32, 827	38, 915	32, 205	31, 441
1929	28, 102	37, 880	34, 458	31, 016
1930	29, 507	30, 072	28, 960	24, 809
1931	23, 438	30, 758	33, 377	29, 969
New England Havana seed, type 52:				
1927	43, 524	49, 565	44, 582	42, 408
1928	40, 889	45, 376	46, 066	36, 905
1929	38, 076	39, 946	35, 558	31, 388
1930	33, 487	43, 468	35, 732	32, 898
1931	32, 739	42, 176	38, 265	33, 442
New York Havana seed, type 53:				
1927	3, 783	4, 425	3, 509	3, 196
1928	2, 673	2, 601	2, 608	2, 279
1929	2, 054	3, 342	2, 781	2, 200
1930	2, 395	2, 811	2, 533	2, 166
1931	2, 837	3, 558	3, 644	3, 034
Wisconsin cigar leaf, type 54:				
1927	82, 781	107, 151	96, 658	83, 058
1928	69, 925	94, 135	84, 924	72, 543
1929	62, 359	97, 345	97, 380	86, 701
1930	72, 614	101, 420	97, 023	85, 274
1931	73, 291	97, 515	112, 555	105, 169
New England shadegrown, type 61:				
1927	8, 659	7, 606	6, 494	6, 492
1928	8, 363	7, 878	5, 878	6, 815
1929	8, 722	8, 749	5, 954	6, 476
1930	11, 329	10, 499	10, 207	10, 162
1931	11, 771	10, 818	10, 255	10, 863
Georgia and Florida shade, type 62:				
1929	-------	3, 844	3, 564	4, 824
1930	5, 048	4, 950	3, 868	5, 921
1931	5, 165	4, 428	4, 110	5, 197
Miscellaneous,[1] eastern Ohio, export:				
1927	1, 375	1, 520	1, 501	946
1928	1, 501	1, 673	1, 415	985
1929	1, 614	-------	-------	-------
Miscellaneous,[2] domestic, type 70:				
1929	-------	5, 928	3, 122	2, 302
1930	1, 989	4, 105	2, 932	2, 918
1931	2, 723	2, 973	2, 843	2, 573

Bureau of Agricultural Economics.

[1] Not including small quantities of other miscellaneous, e. g., Louisiana Perique.
[2] Includes Eastern Ohio Export and all other tobacco classed as miscellaneous.

TABLE 174.—*Tobacco: Exports, by types, 1923–24 to 1930–31*

Year beginning October	Flue-cured, types 11–14 [1]	Virginia fire-cured, type 21	Kentucky and Tennessee fire-cured, [2] types 22 and 23	Burley, type 31	Southern Maryland, [3] type 32	Green River, [4] type 36
	Million pounds	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*
1923–24	266.0	27.4	167.1	7.7	19.2	16.2
1924–25	207.5	25.7	125.3	6.0	13.7	16.8
1925–26	324.4	19.3	110.0	5.8	12.3	14.4
1926–27	288.7	22.0	128.4	18.1	18.8	14.2
1927–28	328.9	21.2	84.7	7.1	12.6	8.1
1928–29	411.8	18.1	75.4	6.1	13.1	9.9
1929–30	429.9	18.1	104.5	9.7	7.8	8.9
1930–31	432.7	11.8	74.1	8.7	10.5	5.4

Bureau of Agricultural Economics. Complied from reports of the Bureau of Foreign and Domestic Commerce.

[1] Year beginning July.
[2] Includes Henderson fire-cured.
[3] Includes eastern Ohio.
[4] Includes one-sucker prior to 1927–28.

TABLE 175.—*Tobacco, unmanufactured: International trade, average 1925–1929, annual, 1928–1930*

Country	Calendar year							
	Average, 1925–1929		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
United States	525,232	78,243	583,846	74,797	565,902	68,066	579,704	71,543
Dutch East Indies	170,071	11,967	154,127	11,376	161,289	17,098	[2] 131,529	[2] 13,690
Greece	109,224	[3] 50	108,234	44	110,351		108,455	
Brazil	67,864	3,869	64,495	3,772	67,251	4,703	80,949	3,733
Bulgaria	57,616	0	49,381	0	44,583	0	49,500	
Philippine Islands	47,940	674	49,371	816	64,833	505	50,279	412
Cuba	42,279	0	50,708	0	46,693	0	58,791	0
British India	40,432	16,192	42,177	16,562	37,623	17,373	38,835	12,417
Dominican Republic	36,528	0	31,014	0	36,297	0	28,594	0
Algeria	33,841	10,375	40,474	11,523	35,741	12,308	25,932	12,481
Paraguay	14,252	[3] 162	12,269		18,995			
Hungary	12,392	7,393	15,185	7,562	30,112	6,483	23,208	6,977
Russia	9,873	0	12,681	0	20,148	0	20,086	0
Yugoslavia	4,994	766	6,219	2,663	7,453	650	2,659	602
Ceylon	2,243	[4] 34	1,643	116	3,194		1,294	
Total	1,174,781	129,725	1,221,824	129,231	1,250,465	127,186	1,199,815	121,855
PRINCIPAL IMPORTING COUNTRIES								
Germany	679	217,778	683	244,290	916	228,112	1,997	234,658
United Kingdom	6,211	202,589	5,621	206,996	8,403	230,623	8,336	223,399
China	24,737	104,548	19,677	142,647	17,207	121,459	15,859	124,349
France	403	92,321	510	67,825	119	85,568	1,483	155,028
Netherlands	3,115	70,090	3,082	71,297	2,471	72,438	3,260	70,564
Spain	37	53,921	0	68,156	185	67,416	1	57,070
Belgium	82	44,943	83	46,129	102	47,733	366	49,314
Czechoslavakia	7	38,996	7	24,918	1	45,284	0	22,826
Poland	723	33,809	335	22,568	256	36,338	227	42,342
Austria	2,111	31,367	2,490	33,245	2,492	28,819	2,670	22,048
Argentina	417	23,945	412	26,695	451	25,448	1,042	22,878
Australia [5]	7	21,622	0	23,683	0	21,138	0	20,284
Canada	5,467	17,057	6,200	17,943	7,244	17,718	3,041	17,435
Egypt	0	16,639	0	17,117	0	17,072	0	15,805
Italy	7,333	16,165	7,601	13,334	9,345	16,530	7,285	12,033
Switzerland	92	13,166	71	13,896	172	15,651	456	16,573
Japan	2,952	12,855	814	14,689	280	15,261	3,295	10,043
Sweden	166	12,099	214	8,788	254	17,061	160	10,415
Denmark	2	11,835	0	12,312	0	12,523		14,097
Irish Free State	269	8,934	191	8,134	108	9,328		12,462
Finland	0	7,094	0	7,379	0	7,739	0	9,831
Norway	0	5,037	0	5,210	0	5,533	0	5,398
Total	54,810	1,056,810	47,991	1,097,251	50,006	1,144,792	49,478	1,168,852

Bureau of Agricultural Economics. Official sources. Tobacco comprises leaf, stems, and strippings, but not snuff.

[1] Preliminary. [2] Java and Madura only. [3] 2-year average. [4] 4-year average. [5] Year ended June 30.

STATISTICS OF FRUITS AND VEGETABLES

TABLE 176.—*Almonds: Production and value, California, 1922–1931*

Year	Production	Seasonal farm price	Farm value	Year	Production	Seasonal farm price	Farm value
	Short tons	*Dollars*	*1,000 dollars*		*Short tons*	*Dollars*	*1,000 dollars*
1922	8, 500	290. 00	2, 465	1927	12, 000	320. 00	3, 840
1923	11, 000	260. 00	2, 860	1928	14, 000	340. 00	4, 760
1924	8, 000	300. 00	2, 400	1929	4, 700	480. 00	2, 256
1925	7, 500	400. 00	3, 000	1930	13, 500	200. 00	2, 700
1926	16, 000	300. 00	4, 800	1931 [1]	14, 800	[2] 176. 00	2, 605

Bureau of Agricultural Economics.

[1] Preliminary. [2] Seasonal average price to Dec. 1.

TABLE 177.—*Apples: Production, car-lot shipments, prices and foreign trade 1919–1931*

Year	Production: Total	Production: Commercial	Price per bushel received by producers Dec. 1	Average price of Baldwins per barrel at Boston, season November to April [1]	Car-lot shipments from crop of year shown: Cars	Car-lot shipments: Equivalent bushels[2]	Foreign trade, year beginning July [3]: Domestic exports: Fresh	Domestic exports: Dried	Domestic exports: Dried in terms of fresh	Domestic exports: Canned in terms of fresh	Imports, fresh and dried in terms of fresh	Net exports[4]: Total	Net exports[4]: Percentage of production
	1,000 bush.	*1,000 bush.*	*Dolls.*	*Dolls.*		*1,000 bush.*	*1,000 bush.*	*1,000 pounds*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*P. ct.*
1919	*136, 561*												
1919	142, 086	78, 477	1. 84	6. 71			3, 152	11, 819	1, 231		849	3, 534	2. 5
1920	223, 677	101, 715	1. 15	4. 02	116, 117	69, 670	7, 995	18, 053	1, 881		142	9, 734	4. 4
1921	99, 002	64, 671	1. 68	6. 69	89, 559	53, 735	3, 282	12, 431	1, 295		1, 353	3, 224	3. 3
1922	202, 702	95, 835	. 99	4. 84	113, 961	68, 377	5, 269	12, 817	1, 335		189	6, 415	3. 2
1923	202, 842	107, 808	1. 02		138, 184	84, 405	12, 295	30, 410	3, 168		132	15, 331	7. 6
1924	*152, 967*												
1924	171, 725	84, 039	1. 18	5. 65	103, 843	61, 763	9, 604	19, 225	2, 002	324	106	11, 824	6. 9
1925	172, 389	99, 738	1. 26	4. 88	127, 804	77, 885	11, 015	24, 833	2, 587	310	74	13, 838	8. 0
1926	246, 609	117, 384	. 74	3. 42	133, 550	80, 800	21, 293	32, 670	3, 403	389	84	25, 001	10. 1
1927	123, 693	78, 051	1. 39	6. 60	93, 094	58, 375	9, 430	21, 704	2, 261	330	154	11, 867	9. 6
1928	186, 893	106, 383	. 99	4. 66	127, 530	80, 151	21, 043	50, 024	5, 221	663	117	26, 810	14. 3
1929	135, 622	86, 529	1. 31	5. 12	102, 801	64, 022	10, 279	23, 769	2, 476	481	309	12, 927	9. 5
1930	155, 982	101, 004	. 93	3. 12	109, 794	71, 425	20, 340	38, 121	3, 971	369	103	24, 577	15. 8
1931 [5]	211, 506	104, 196	. 58		[6] 100, 823								

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board; italic figures are census returns. Prices to producers are based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 census. Earlier years not so revised.

[1] Figures 1919–1922 from Boston Chamber of Commerce reports, average of weekly quotations of price actually paid by wholesale dealers on days quoted. Figures 1924–1930 from Special Apple Market Report issued by Mass. Dept. of Agr., Div. of Markets, based on prices "for sales by original receivers."

[2] For years 1920–1922, it is assumed that the car lots averaged 600 bushels per car. For years 1923 to 1931, inclusive, the estimates of bushels shipped have been calculated according to estimated loadings in each State.

[3] Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1926; January and June issues, 1927–1931; and official records of the Bureau of Foreign and Domestic Commerce.

[4] Total exports (domestic plus foreign) minus imports.

[5] Preliminary.

[6] December forecast of total shipments from 1931 crop.

TABLE 178.—*Apples: Production, by States, 1926–1931*

State and division	Total						Commercial [1]					
	1926	1927	1928	1929	1930	1931 [2]	1926	1927	1928	1929	1930	1931
	1,000 bush.	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*
Maine	2,260	2,236	1,400	2,480	2,170	1,310	1,350	1,365	861	1,800	1,410	789
New Hampshire	1,240	1,100	1,000	870	1,256	578	762	690	615	531	762	348
Vermont	800	990	560	1,029	762	800	465	570	330	633	477	501
Massachusetts	4,100	2,520	2,700	2,440	4,389	1,713	2,640	1,590	1,734	1,557	2,808	1,098
Rhode Island	391	242	230	285	452	318	237	150	144	174	270	189
Connecticut	1,900	1,045	1,500	830	1,615	675	1,050	540	753	489	957	402
New York	40,375	13,600	21,900	14,412	24,200	19,100	18,000	8,163	12,690	10,212	16,125	11,700
New Jersey	4,310	2,697	3,290	2,149	4,242	3,520	2,832	1,833	2,238	1,449	2,910	2,199
Pennsylvania	17,000	6,300	8,460	6,040	9,936	14,000	5,388	2,550	3,129	2,550	3,873	5,514
North Atlantic	72,376	30,730	41,040	30,535	49,022	42,014	32,724	17,451	22,494	19,395	29,592	22,740
Ohio	11,900	5,600	5,880	2,660	3,500	14,790	3,018	1,623	1,647	741	1,050	4,056
Indiana	4,100	1,249	2,520	1,085	1,240	3,990	864	276	528	243	291	888
Illinois	9,000	4,450	7,150	3,600	3,708	8,961	3,870	2,250	3,720	2,400	2,808	5,490
Michigan	9,045	4,288	5,400	6,900	5,223	9,620	4,467	2,271	2,787	3,618	3,135	5,052
Wisconsin	2,158	1,200	2,160	1,967	1,015	1,820	465	270	477	396	210	390
Minnesota	1,263	854	1,230	905	391	1,139	171	111	114	87	39	111
Iowa	3,652	1,720	2,740	1,650	975	1,755	402	207	330	255	150	276
Missouri	5,015	2,104	3,380	2,200	1,560	8,000	1,857	870	1,422	1,140	849	2,250
South Dakota	169	200	230	161	114	11						
Nebraska	700	850	470	650	396	600	228	330	90	270	150	330
Kansas	1,428	1,925	820	1,310	601	2,020	930	1,347	540	864	396	1,464
North Central	48,430	24,440	31,980	23,088	18,723	52,706	16,272	9,555	11,655	10,014	9,078	20,307
Delaware	2,376	1,150	1,520	911	1,600	1,785	1,980	900	1,290	819	1,401	1,200
Maryland	3,500	1,700	2,190	2,200	1,650	3,582	1,800	1,200	1,326	1,365	990	1,740
Virginia	19,902	6,600	16,100	13,054	7,700	21,889	11,100	4,950	11,100	9,300	4,350	10,500
West Virginia	10,875	5,000	8,750	5,716	4,306	12,954	5,100	4,050	4,410	4,200	2,040	4,791
North Carolina	5,986	1,825	5,040	2,628	2,555	5,475	1,035	273	750	450	300	822
South Carolina	647	363	480	180	300	374						
Georgia	1,827	595	1,400	650	1,126	1,500	456	240	351	216	327	300
South Atlantic	45,113	17,233	35,480	25,339	19,237	47,559	21,471	11,613	19,227	16,350	9,408	19,353
Kentucky	6,408	720	5,700	1,400	935	5,390	501	75	456	159	96	558
Tennessee	5,360	1,152	3,790	1,375	1,300	3,780	375	81	264	138	114	300
Alabama	1,328	328	885	437	608	1,100						
Mississippi	324	152	250	140	160	272						
Arkansas	3,450	1,015	2,200	1,300	1,441	4,200	1,500	609	1,242	660	780	2,457
Louisiana	35	18	30	17	25	39						
Oklahoma	770	493	350	488	226	400	93	60	33	66	21	60
Texas	380	168	216	190	125	215						
South Central	18,055	4,046	13,421	5,347	4,820	15,396	2,469	825	1,995	1,023	1,011	3,375
Montana	410	295	516	555	505	434	309	153	450	345	393	300
Idaho	4,200	6,000	5,500	5,350	5,200	5,000	2,775	5,478	4,800	4,680	4,650	3,969
Wyoming	47	40	48	56	49	24						
Colorado	3,444	2,592	3,020	2,300	1,060	2,090	2,907	2,253	2,700	2,160	1,005	1,500
New Mexico	1,147	456	675	1,136	448	1,089	600	360	507	840	306	450
Arizona	112	62	76	84	74	97	33	30	24	27	27	30
Utah	817	660	880	610	1,100	400	480	450	570	345	945	225
Nevada	42	18	52	42	50	35						
Washington	34,030	25,343	33,500	29,500	37,850	31,400	25,950	22,302	30,000	24,687	33,597	25,200
Oregon	8,036	4,320	7,600	3,800	6,200	4,150	5,250	2,925	5,100	2,250	4,470	2,100
California	10,350	7,458	13,105	7,880	11,644	9,112	6,144	4,656	6,861	4,413	6,522	4,647
Western	62,635	47,244	64,972	51,313	64,180	53,831	44,448	38,607	51,012	39,747	51,915	38,421
United States	246,609	123,693	186,893	135,622	155,982	211,506	117,384	78,051	106,383	86,529	101,004	104,196

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Estimates of production for 1929 and 1930 revised on basis of 1930 census. Earlier years not so revised.

[1] Included in "Total crop." By commercial crop is meant that portion of the total crop which is sold for consumption as fresh fruit.

[2] Preliminary.

TABLE 179.—*Apples: Car-lot shipments by State of origin, 1930–31 and 1931–32 and total United States shipments, 1923–24 to 1931–32* [1]

State and crop season	Crop-movement season [2]													
	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total
EASTERN														
New England States:	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
1930–31	-----	-----	1	481	1,177	1,072	327	146	40	28	6	-----	-----	3,278
1931–32	-----	-----	2	363	357	31	5	-----	-----	-----	-----	-----	-----	-----
New York:														
1930–31	-----	29	493	1,448	3,642	2,875	1,477	1,878	1,723	1,091	462	258	53	15,429
1931–32	-----	5	121	817	1,344	988	666	-----	-----	-----	-----	-----	1	-----
Pennsylvania:														
1930–31	-----	39	51	234	961	588	220	285	228	144	14	-----	-----	2,765
1931–32	-----	26	24	173	1,021	609	300	-----	-----	-----	-----	-----	-----	-----
Illinois:														
1930–31	257	339	256	1,080	1,198	66	36	34	22	41	32	27	-----	3,388
1931–32	253	679	183	969	1,717	486	119	-----	-----	-----	-----	-----	-----	-----
Michigan:														
1930–31	-----	29	270	450	983	116	23	7	3	2	-----	1	-----	1,884
1931–32	-----	4	90	327	1,343	673	116	-----	-----	-----	-----	-----	-----	-----
Missouri:														
1930–31	6	45	62	179	148	24	10	4	17	35	5	6	-----	541
1931–32	-----	27	54	312	479	154	27	-----	-----	-----	-----	-----	-----	-----
Delaware:														
1930–31	25	732	65	110	290	79	19	12	19	2	-----	-----	-----	1,353
1931–32	2	404	18	47	186	38	2	-----	-----	-----	-----	-----	-----	-----
Maryland:														
1930–31	16	203	44	221	607	242	21	9	8	6	-----	-----	-----	1,378
1931–32	2	114	58	263	815	478	156	-----	-----	-----	-----	-----	-----	-----
Virginia:														
1930–31	-----	89	76	931	2,967	1,180	538	604	493	348	111	39	26	7,402
1931–32	-----	124	112	1,900	5,653	2,722	1,039	-----	-----	-----	-----	-----	-----	-----
West Virginia:														
1930–31	3	95	95	572	1,690	585	92	110	87	35	16	1	-----	3,381
1931–32	1	92	135	839	2,759	1,945	440	-----	-----	-----	-----	-----	-----	-----
Arkansas:														
1930–31	15	21	110	32	122	11	9	6	2	3	-----	-----	-----	331
1931–32	8	2	73	181	45	15	2	-----	-----	-----	-----	-----	-----	-----
Other Eastern:														
1930–31	66	293	209	456	585	152	48	66	73	122	20	25	11	2,126
1931–32	73	224	133	846	1,915	681	204	-----	-----	-----	-----	-----	-----	-----
Total Eastern:														
1930–31	388	1,915	1,732	6,194	14,370	6,990	2,820	3,161	2,715	1,857	666	357	91	43,256
1931–32	339	1,700	1,003	7,037	17,634	8,820	3,076	-----	-----	-----	-----	-----	-----	-----
WESTERN														
Idaho:														
1930–31	-----	2	1	1,031	3,242	1,056	650	522	298	111	53	6	-----	6,972
1931–32	-----	-----	1	1,179	1,964	693	550	-----	-----	-----	-----	-----	-----	-----
Colorado:														
1930–31	-----	-----	-----	10	639	251	88	57	26	10	1	-----	-----	1,082
1931–32	-----	-----	-----	70	465	242	106	-----	-----	-----	-----	-----	-----	-----
Washington:														
1930–31	-----	56	391	4,470	13,867	7,393	3,998	3,752	3,763	3,381	2,036	1,456	654	45,217
1931–32	-----	47	257	3,479	8,359	4,081	3,242	-----	-----	-----	-----	-----	-----	-----
Oregon:														
1930–31	-----	7	44	306	2,400	1,357	473	277	249	226	161	96	28	5,624
1931–32	-----	-----	33	181	843	248	202	-----	-----	-----	-----	-----	-----	-----
California:														
1930–31	32	1,347	695	1,092	1,288	471	157	161	173	164	174	156	43	5,953
1931–32	61	1,388	620	735	457	113	57	-----	-----	-----	-----	-----	-----	-----
Other Western:														
1930–31	-----	-----	67	256	1,046	233	49	18	12	4	5	-----	-----	1,690
1931–32	-----	-----	55	109	278	76	12	-----	-----	-----	-----	-----	-----	-----
Total Western:														
1930–31	32	1,412	1,198	7,165	22,482	10,761	5,415	4,787	4,521	3,896	2,430	1,714	725	66,538
1931–32	61	1,435	966	5,753	12,366	5,453	4,169	-----	-----	-----	-----	-----	-----	-----
Total:														
1923–24	152	3,360	4,122	16,689	49,876	26,571	8,061	8,299	8,213	6,370	3,469	2,295	707	138,184
1924–25	205	2,362	3,126	14,641	39,866	20,231	6,399	5,294	4,023	3,277	2,295	1,615	509	103,843
1925–26	433	2,895	4,330	20,905	44,895	20,085	7,372	6,253	6,855	6,228	4,114	2,494	945	127,804
1926–27	260	3,840	3,387	20,950	45,321	23,251	8,365	7,969	8,020	5,348	3,596	2,355	888	133,550
1927–28	253	1,815	3,539	12,106	33,556	17,109	5,963	5,315	4,900	3,500	2,355	1,819	864	93,094
1928–29	230	3,452	4,330	19,405	45,901	19,774	8,309	7,774	7,749	5,418	2,944	1,710	534	127,530
1929–30	514	2,022	3,791	13,996	37,689	14,648	5,982	6,223	6,397	5,217	3,662	1,974	686	102,801
1930–31	420	3,327	2,930	13,359	36,852	17,751	8,235	7,948	7,236	5,753	3,096	2,071	816	109,794
1931–32	400	3,135	1,969	12,790	30,000	14,273	7,245	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis. See preceding Yearbooks for data for earlier years.

[1] Beginning January, 1931, figures a e subject to revision.
[2] Crop movement season extends from June of one year through June of the following year.

TABLE 180.—*Apples: Cold-storage holdings, 1922–1931*

BARRELS [1]

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	Oct. 1	Nov. 1	Dec. 1
	1,000 barrels	*1,000 barrels*	*1,000 barrels*	*1,000 barrels*	*1,000 barrels*	*1,000 barrels*	*1,000 barrels*	*1,000 barrels*	*1,000 barrels*
1922	1,742	1,424	996	561	248	74	1,219	4,133	4,319
1923	3,708	2,839	2,013	1,199	578	150	584	4,226	5,010
1924	4,512	3,634	2,755	1,768	1,044	430	479	3,172	3,709
1925	3,254	2,498	1,803	1,046	504	165	885	3,749	4,245
1926	3,855	3,157	2,288	1,307	617	221	484	3,188	4,554
1927	4,077	3,178	2,152	1,286	650	229	449	1,864	2,055
1928	1,699	1,266	846	501	262	121	652	2,978	2,889
1929	2,354	1,678	1,128	652	319	108	735	2,189	2,097
1930	1,762	1,316	897	481	229	96	500	1,571	1,456
1931	1,197	834	482	200	86	38	398	2,285	2,177

BUSHEL BASKETS [2]

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	Oct. 1	Nov. 1	Dec. 1
	1,000 baskets	*1,000 baskets*	*1,000 baskets*	*1,000 baskets*	*1,000 baskets*	*1,000 baskets*	*1,000 baskets*	*1,000 baskets*	*1,000 baskets*
1923							241	1,179	1,400
1924	1,351	1,078	808	471	208	64	193	1,138	1,374
1925	1,167	940	608	314	117	29	519	2,056	2,419
1926	2,103	1,672	1,138	672	329	124	352	2,235	2,713
1927	2,472	2,037	1,589	952	533	199	724	3,309	3,905
1928	3,177	2,315	1,536	900	460	222	1,084	4,932	5,057
1929	4,240	3,204	2,171	1,308	590	220	1,793	6,379	6,613
1930	5,507	4,005	2,805	1,555	763	309	1,982	6,748	6,946
1931	5,996	4,469	2,855	1,300	571	193	2,032	9,787	10,817

BOXES

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	Oct. 1	Nov. 1	Dec. 1
	1,000 boxes	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*
1922	11,061	8,667	6,282	4,107	2,088	721	669	4,164	7,271
1923	8,319	7,612	5,593	3,345	1,475	380	789	6,886	13,866
1924	14,201	11,550	8,821	5,837	2,901	949	829	6,620	9,917
1925	9,089	7,264	5,266	3,412	1,801	674	1,091	9,165	13,041
1926	11,868	10,009	7,898	5,350	2,892	1,104	1,809	9,523	15,083
1927	13,365	10,435	7,298	4,613	2,312	717	1,043	9,074	13,423
1928	12,260	9,809	7,023	4,960	2,889	1,223	1,854	12,333	17,452
1929	15,853	12,388	7,995	4,889	2,224	631	901	11,015	15,235
1930	13,108	10,149	7,282	4,790	2,446	761	2,135	15,669	21,267
1931	19,137	15,347	11,371	6,852	3,683	1,425	3,203	15,472	16,849

TOTAL, IN BUSHELS [3]

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	Oct. 1	Nov. 1	Dec. 1
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1922	16,287	12,939	9,270	5,790	2,832	942	4,356	16,563	20,229
1923	19,443	16,128	11,631	6,942	3,210	831	2,781	20,742	30,297
1924	29,088	23,529	17,895	11,613	6,240	2,304	2,460	17,274	22,419
1925	20,019	15,699	11,283	6,864	3,429	1,197	4,266	22,467	28,194
1926	25,536	21,153	15,900	9,942	5,073	1,890	3,612	21,321	31,458
1927	28,068	22,005	15,342	9,423	4,794	1,602	3,114	17,976	23,493
1928	20,534	15,923	11,097	7,363	4,134	1,808	4,893	26,199	31,177
1929	27,154	20,626	13,551	8,153	3,772	1,174	4,900	23,991	28,139
1930	23,902	18,102	12,778	7,787	3,895	1,358	5,618	27,129	32,580
1931	28,725	22,317	15,672	8,751	4,512	1,731	6,429	32,115	34,197

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

[1] Previous to Oct. 1, 1923, apples packed in bushel baskets are included in this tabulation on a basis of 3 bushels to the barrel.

[2] Prior to Oct. 1, 1923, included with barreled apples.

[3] 1 barrel is considered the equivalent of 3 boxes or 3 bushel baskets.

TABLE 181.—*Apples:*[1] *International trade, average 1925–1929, annual 1927–1930*

Country	Calendar year									
	Average 1925–1929		1927		1928		1929		1930 [2]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*
United States	14,448	137	15,534	163	13,635	112	16,856	268	15,850	157
Canada	3,626	542	2,902	631	2,977	633	4,665	440	6,390	485
Australia [3]	2,161	0	1,316	0	3,619	0	1,342	0	3,621	0
France [4]	1,880	638	1,729	491	956	615	422	1,534	1,316	1,898
Italy	1,597	1	1,659	0	1,405	1	1,906	1	1,908	3
Netherlands	1,309	422	1,462	401	585	391	1,738	557	448	778
Belgium	1,122	303	1,301	361	773	274	1,108	405	1,005	705
Rumania	[5] 784	[5] 0	[4] 509	[4] 0	------	------	------	------	------	------
Yugoslavia	783	[5] 2	719	1	463	0	1,125	6	2,688	2
New Zealand	565	31	441	36	814	21	789	30	1,072	27
Total	28,275	2,076	27,572	2,084	25,227	2,047	29,951	3,241	34,298	4,055
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom	0	14,247	0	13,511	0	13,401	0	12,832	0	13,583
Germany	34	8,415	31	7,891	17	9,777	38	7,501	40	11,195
Sweden	0	754	0	757	0	874	0	998	150	683
Denmark	0	684	0	943	0	638	0	825	------	689
Irish Free State	0	469	0	449	0	441	0	441	0	449
Egypt	2	379	2	366	3	345	3	487	[4] 1	360
Norway [4]	0	202	0	249	0	186	0	219	------	169
Brazil	0	191	0	128	0	214	0	268	0	114
Finland	0	178	0	161	0	210	0	218	0	166
Cuba	0	96	0	130	0	94	0	78	0	80
Poland	18	88	8	30	25	49	7	274	150	484
Total	54	25,703	41	24,615	45	26,229	48	24,141	341	27,972

Bureau of Agricultural Economics. Official sources.

[1] Foreign weights are converted to bushels on the basis of 48 pounds per bushel; domestic, 1 barrel equals 3 boxes (or bushels). [2] Preliminary. [3] Year ended June 30. [4] Includes pears. [5] 3-year average.

TABLE 182.—*Apples: Estimated average price per bushel received by producers, United States, 1922–23 to 1931–32*

Crop year	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	202.7	181.7	100.4	94.3	93.4	101.5	108.6	131.5	142.3	144.9	156.5	178.7	109.4
1923–24	188.6	166.7	121.4	108.0	114.0	114.6	114.0	121.3	125.0	129.1	129.4	131.3	117.4
1924–25	159.3	141.3	121.6	109.8	115.9	119.5	128.2	144.9	150.7	155.4	158.4	179.2	122.1
1925–26	201.4	158.7	130.7	112.5	120.5	127.7	137.4	146.3	146.3	139.8	143.2	148.2	127.0
1926–27	168.7	133.8	103.8	88.4	80.2	81.6	87.7	97.3	98.8	100.0	103.8	113.5	88.3
1927–28	140.0	144.4	135.8	130.7	134.7	141.8	152.4	161.7	168.3	177.0	183.3	190.6	141.7
1928–29	188.7	156.0	105.5	96.6	99.4	107.9	118.5	124.1	129.9	134.1	133.5	147.9	110.3
1929–30	153.1	160.5	138.9	131.0	137.9	135.6	143.4	148.3	154.0	155.2	159.9	168.2	141.4
1930–31	173.6	144.8	106.3	103.2	98.4	96.7	98.8	103.8	106.0	105.5	117.1	121.9	102.7
1931–32	131.5	107.9	77.4	70.7	58.9	61.3	64.7	------	------	------	------	------	---------

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by car-lot shipments.

TABLE 183.—*Apricots: Production and value, California, 1922–1931*

Year	Production	Seasonal farm price	Farm value	Year	Production	Seasonal farm price	Farm value
	Short tons	*Dollars*	*1,000 dolls.*		*Short tons*	*Dollars*	*1,000 dolls.*
1922	145,000	70.00	10,150	1927	208,000	57.00	11,856
1923	210,000	25.00	5,250	1928	175,000	50.00	8,750
1924	142,000	46.00	6,532	1929	215,000	63.00	13,545
1925	150,000	54.00	8,100	1930	[1] 200,000	39.00	7,476
1926	176,000	63.00	11,088	1931 [2]	[1] 245,000	[3] 29.00	6,989

Bureau of Agricultural Economics.

[1] Includes some fruit not harvested on account of market conditions (but not included in computing value), as follows: 1930, 8,300 tons; 1931, 4,000 tons.
[2] Preliminary. [3] Seasonal average price to Dec. 1.

TABLE 184.—*Asparagus, commercial crop: Acreage, production, and price per crate or ton, 1928–1931*

Utilization	Acreage				Production				Seasonal farm price			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	Acres	*Acres*	*Acres*	*Acres*	*1,000 crates* [1]	*1,000 crates* [1]	*1,000 crates* [1]	*1,000 crates* [1]	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
For market	49, 620	46, 400	52, 890	63, 940	3, 957	3, 446	4, 510	5, 283	2. 44	2. 71	2. 27	2. 04
					Tons [2]	*Tons* [2]	*Tons* [2]	*Tons* [2]				
For manufacture	39, 550	45, 760	44, 670	38, 840	62, 900	72, 310	72, 160	48, 290	79. 40	81. 91	81. 17	75. 25
					1,000 crates	*1,000 crates*	*1,000 crates*	*1,000 crates*				
Total	89, 170	92, 160	97, 560	102,780	9, 199	9, 472	10, 524	9, 307	1. 59	1. 61	1. 53	1. 55

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and canning establishments.

[1] Crates containing approximately 24 pounds. [2] Short tons.

TABLE 185.—*Beans, snap, commercial crop: Acreage, production, and price per bushel or ton, 1928–1931*

Utilization	Acreage				Production				Seasonal farm price			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	Acres	*Acres*	*Acres*	*Acres*	*1,000 bush.* [1]	*1,000 bush.* [1]	*1,000 bush.* [1]	*1,000 bush.* [1]	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
For market	96, 180	94, 380	110, 580	114, 000	7, 370	8, 937	[2] 10, 298	[2] 9, 615	1. 72	1. 63	1. 39	1. 30
					Tons [3]	*Tons* [3]	*Tons* [3]	*Tons* [3]				
For manufacture	45, 640	65, 040	78, 690	54, 110	70, 200	92, 300	90, 400	69, 100	61. 24	62. 70	62. 15	53. 69
Total	141, 820	159, 420	189, 270	168, 110	158, 640	199, 540	[2] 213, 980	[2] 184, 480	106. 83	101. 84	92. 16	87. 42

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and canning establishments.

[1] Bushels containing approximately 24 pounds.
[2] Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.
[3] Short ton.

TABLE 186.—*Beans, snap: Car-lot shipments, by State of origin, 1920–1931*

State	Calendar year											
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931 [1]
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
New York	43	28	11	33	81	62	39	31	49	69	30	101
New Jersey	90	111	68	15	100	48	56	203	110	61	114	129
Maryland	159	22	149	49	136	127	197	235	246	214	352	479
Virginia	155	79	268	101	899	570	841	877	657	1, 025	541	591
North Carolina	133	128	219	261	559	459	550	504	690	736	998	710
South Carolina	142	331	503	585	517	334	449	425	439	779	682	703
Georgia	6	26	65	26	68	27	51	96	48	152	230	171
Florida [2]	607	367	715	1, 644	1, 157	1, 992	946	2, 583	2, 700	3, 254	4, 118	4, 319
Tennessee	20	23	63	81	248	84	174	45	119	132	233	83
Mississippi	105	79	252	47	85	88	130	143	192	312	310	209
Arkansas	2	-------	1	2	7	13	18	18	69	92	130	38
Louisiana	35	202	90	107	439	683	588	662	822	1, 156	744	852
Texas	7	39	26	88	210	407	414	471	294	356	654	606
Colorado	-------	-------	2	-------	-------	5	-------	5	3	58	165	76
California	17	60	20	26	32	118	127	60	116	77	119	93
Other States	12	65	144	59	144	116	126	123	132	153	139	154
Total	1, 533	1, 560	2, 596	3, 124	4, 682	5, 133	4, 706	6, 481	6, 686	8, 626	9, 559	9, 314

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis. Beginning 1931 figures include lima beans in pod.

[1] Preliminary.
[2] Figures for Florida include cars moved in preceding calendar year, as follows: 1920, 35 cars in November and 37 in December; 1921, 11 cars in November and 1 in December; 1922, 26 cars in November and 26 in December; 1923, 41 cars in November and 46 inDecember; 1924, 1 car in October, 75 in November, and 215 in December; 1925, 73 cars in November and 154 in December; 1926, 1 car in October, 177 in November, and 140 in December; 1927, 14 cars in October, 152 in November, and 300 in December, 1928, 29 cars in October, 710 in November, and 547 in December; 1929, 3 cars in October, 160 in November, and 203 in December; 1930, 9 cars in October, 298 in November, and 993 in December; 1931, 224 cars in October, 1,019 in November, and 333 in December.

TABLE 187.—*Cabbage, commercial crop: Acreage, production, and price per ton, by States, 1928–1931*

FOR MARKET AND SAUERKRAUT

Group and State	Acreage				Production				Seasonal farm price to Dec. 1, per ton			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Fall:	*Acres*	*Acres*	*Acres*	*Acres*	*Tons* [1]	*Tons* [1]	*Tons* [1]	*Tons* [1]	*Dols.*	*Dols.*	*Dols.*	*Dols.*
South Carolina	600	350	750	900	2,400	2,900	9,400	9,000	46.75	68.50	36.00	41.76
Virginia, Norfolk	180	180	300	100	900	1,100	1,300	100	71.08	50.00	35.00	43.50
Group total	780	530	1,050	1,000	3,300	4,000	10,700	9,100	53.33	63.50	35.89	41.76
Early: [2]												
California	4,850	4,600	4,050	4,400	29,600	24,800	20,700	[3] 26,000	31.01	21.01	28.02	15.28
Florida	2,900	6,500	3,700	6,500	16,000	39,000	25,500	[3] 48,100	36.93	33.60	63.20	22.40
Louisiana, winter	3,700	3,500	3,000	2,800	21,100	16,400	9,900	11,500	23.09	22.10	35.75	16.60
Texas	15,840	20,400	18,000	26,900	91,900	118,300	82,800	[3] 161,400	19.15	13.58	46.35	5.60
Group total	27,290	35,000	28,750	40,600	158,600	198,500	138,900	[3] 247,000	23.68	19.14	45.96	10.81
Second early:												
Alabama	2,200	2,050	1,550	1,950	10,800	10,200	7,800	13,300	62.62	20.00	45.00	14.00
Georgia	100	720	410	400	300	3,600	3,000	2,800	30.60	20.00	35.00	15.00
Mississippi	2,700	3,600	2,850	3,100	14,800	20,500	12,800	15,500	45.50	21.30	37.00	13.50
North Carolina	680	850	800	700	3,400	6,000	4,800	3,500	54.00	20.00	44.00	14.00
South Carolina	2,500	3,300	3,100	3,000	15,500	29,000	31,000	[3] 31,800	49.02	31.50	42.50	15.38
Virginia	4,900	4,800	4,750	4,150	17,200	37,800	20,200	[3] 18,400	33.72	25.37	28.47	18.92
Eastern Shore	1,500	1,900	1,250	1,000	7,000	17,500	6,200	5,200	27.58	20.00	25.00	18.80
Norfolk	3,400	2,900	3,500	3,150	10,200	20,300	14,000	13,200	37.97	30.00	30.00	19.00
Group total	13,080	15,320	13,460	13,300	62,000	107,100	79,600	[3] 85,300	46.48	25.27	38.12	15.21
Intermediate:												
Arkansas	450	400	450	500	2,000	1,000	1,100	2,500	14.00	12.50	29.50	13.00
Delaware	250	250	250	250	1,400	1,700	1,200	1,600	40.00	20.00	28.00	14.65
Illinois	1,700	1,890	2,320	2,090	15,500	16,100	20,000	12,500	11.35	19.75	16.40	16.15
Iowa	1,480	1,650	2,000	1,400	13,300	10,600	12,400	7,100	16.05	22.83	15.08	11.70
Kentucky	260	160	140	200	1,600	1,600	600	1,400	15.00	30.00	34.00	20.00
Maryland	2,000	2,320	2,500	1,780	12,800	16,500	10,200	9,600	22.40	19.88	35.20	14.27
Missouri	950	860	950	980	5,200	6,000	6,100	5,100	11.25	16.83	20.82	17.50
New Jersey	4,000	4,500	4,800	4,100	23,200	22,500	26,900	26,200	30.00	28.00	22.00	20.40
New Mexico	500	600	450	230	3,500	5,400	3,400	1,800	20.00	22.00	20.00	15.00
New York, Long Island	3,090	3,020	2,930	2,930	27,200	30,800	26,400	29,300	23.00	26.25	18.50	18.00
Ohio, southeast	850	840	350	1,050	8,500	7,400	700	[3] 11,600	16.40	25.30	27.45	19.00
Tennessee	2,120	3,000	2,730	2,200	12,900	17,700	18,800	10,600	14.81	20.90	27.25	16.65
Virginia, southwest	2,700	2,650	2,650	2,460	27,000	17,500	6,600	14,800	16.96	33.66	16.97	9.93
Washington	1,950	2,000	2,000	2,050	14,000	17,200	18,800	18,400	17.63	11.00	15.75	13.00
Group total	22,300	24,140	24,520	22,220	168,100	172,000	153,200	[3] 152,500	19.45	23.11	20.72	16.12
Late (domestic):												
Colorado	1,300	1,400	1,700	1,600	18,200	12,200	19,000	11,800	9.51	22.13	9.37	18.00
Indiana	1,510	1,960	2,350	2,360	15,700	12,700	15,000	15,300	10.45	11.89	9.27	12.30
Michigan	2,820	2,960	3,780	3,320	23,400	18,400	22,700	21,600	9.23	9.84	8.11	6.20
Minnesota	910	1,050	1,210	1,150	9,800	8,200	9,000	5,300	8.57	8.78	10.89	11.60
New York	8,960	9,980	11,750	10,000	69,000	97,800	94,000	80,000	18.35	13.85	8.89	6.30
Ohio	2,610	2,900	3,580	2,670	22,700	24,900	20,800	23,800	9.21	7.71	7.79	6.00
Oregon	1,550	1,600	1,630	1,600	13,200	8,000	13,000	14,400	29.88	18.00	15.00	12.50
Pennsylvania	1,110	1,120	1,180	1,130	9,000	11,200	9,400	8,700	21.89	16.79	21.38	10.00
Utah	360	300	630	310	3,600	4,000	10,000	3,800	14.44	15.40	5.90	16.00
Wisconsin	7,690	10,200	14,800	9,570	79,200	81,600	111,100	51,700	9.72	12.00	8.39	7.00
Group total	28,820	33,470	42,610	33,710	263,800	279,000	324,000	236,400	13.36	12.81	9.21	8.17
Late (Danish):												
Colorado	1,600	1,900	2,200	2,200	23,400	22,800	29,700	19,800	14.38	19.50	8.15	13.00
Indiana	-------	200	350	350	-------	1,800	1,800	2,600	-----	19.00	18.00	12.90
Michigan	350	360	600	600	3,000	2,500	3,900	3,900	19.25	21.70	14.25	8.90
Minnesota	1,590	2,450	1,960	1,650	16,100	13,500	9,400	6,600	16.96	22.59	11.60	11.50
New York	19,170	19,640	20,920	21,550	134,200	157,100	154,800	183,200	25.79	16.86	10.03	5.80
Ohio	430	430	450	420	3,000	3,000	2,900	3,200	26.61	14.85	11.90	11.00
Pennsylvania	550	670	710	700	3,800	4,700	4,600	5,600	29.08	20.00	10.85	8.00
Wisconsin	6,750	8,640	11,180	7,430	72,200	67,400	83,800	36,400	19.70	17.93	6.40	9.80
Group total	30,440	34,290	38,370	34,900	255,700	272,800	290,900	261,300	22.45	17.72	8.98	7.28

[1] Short ton.
[2] Season begins in fall of previous year.
[3] Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

TABLE 187.—*Cabbage, commercial crop: Acreage, production, and price per ton, by States, 1928–1931*—Continued

FOR MARKET AND SAUERKRAUT

Group and State	Acreage				Production				Seasonal farm price to Dec. 1, per ton			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Late (total):	*Acres*	*Acres*	*Acres*	*Acres*	*Tons* [1]	*Tons* [1]	*Tons* [1]	*Tons* [1]	*Dols.*	*Dols.*	*Dols.*	*Dols.*
Colorado	2,900	3,300	3,900	3,800	41,600	35,000	48,700	31,600	12.24	20.43	8.62	14.84
Indiana	1,510	2,160	2,700	2,710	15,700	14,500	16,800	17,900	10.45	12.76	10.18	12.40
Michigan	3,170	3,320	4,380	3,920	26,400	20,900	26,600	25,500	10.38	11.24	9.02	6.63
Minnesota	2,500	3,500	3,170	2,800	25,900	21,700	18,400	11,900	13.78	17.37	11.20	11.51
New York	28,130	29,620	32,670	31,550	203,200	254,900	248,800	263,200	23.26	15.71	9.60	5.95
Ohio	3,040	3,330	4,030	3,090	25,700	27,900	23,700	27,000	11.25	8.49	8.31	6.59
Oregon	1,550	1,600	1,630	1,600	13,200	8,000	13,000	14,400	29.88	18.00	15.00	12.50
Pennsylvania	1,660	1,790	1,890	1,830	12,800	15,900	14,000	14,300	24.06	17.74	17.93	9.23
Utah	360	300	630	310	3,600	4,000	10,000	3,800	14.44	15.40	5.90	16.00
Wisconsin	14,440	18,840	25,980	17,000	151,400	149,600	194,900	88,100	14.48	14.68	7.53	8.16
Group total	59,260	67,760	80,980	68,610	519,500	553,400	614,900	497,700	17.84	15.23	9.10	7.70
Miscellaneous	50	70	230	280	400	600	1,300	1,200	7.50	8.33	11.54	10.00
Total, all States	122,760	142,820	148,990	146,010	911,900	1,034,000	998,600	[3] 992,800	21.22	18.51	18.62	10.03
FOR MARKET												
Fall	780	530	1,050	1,000	3,300	4,000	10,700	9,100	53.33	63.50	35.89	41.76
Early [2]	27,290	35,000	28,750	40,600	158,600	198,500	138,900	[3] 247,000	23.68	19.14	45.96	8.36
Second Early	13,080	15,320	13,460	13,300	62,000	107,100	79,600	[3] 85,300	46.48	25.27	38.12	12.25
Intermediate:												
Illinois	1,030	1,220	1,520	1,540	9,300	11,100	13,800	10,900	10.65	21.80	19.28	16.97
Iowa	1,300	1,330	1,200	1,100	11,600	7,600	9,700	6,200	17.07	27.50	17.22	12.42
Tennessee	1,870	2,640	2,130	1,850	11,400	15,800	13,700	7,600	14.65	21.65	32.92	19.21
Virginia	2,200	2,200	2,200	2,160	22,000	14,500	5,200	13,000	18.00	38.14	18.46	10.15
Washington	1,690	1,680	1,680	1,850	11,800	14,300	15,900	16,700	19.07	10.98	15.85	12.99
Other States	12,320	12,920	12,700	11,900	85,200	92,600	76,100	[3] 88,200	23.24	24.45	22.79	17.80
Total	20,410	21,990	21,430	20,400	151,300	155,900	134,400	[3] 142,600	20.26	24.16	22.08	16.32
Domestic (late):												
Colorado	800	900	1,200	1,350	11,200	7,200	13,200	9,400	11.07	26.94	10.38	20.96
Indiana	780	880	950	1,100	8,400	6,800	6,000	9,000	12.74	15.44	12.17	15.89
Michigan	1,200	1,260	1,750	1,900	10,400	7,700	9,300	10,800	11.72	12.47	9.25	6.57
Minnesota	480	550	670	770	5,200	4,200	4,800	3,000	10.00	10.48	14.38	15.33
New York	4,710	5,680	4,470	5,000	36,600	54,400	33,200	35,800	23.44	16.45	13.19	7.79
Ohio (other)	360	200	280	470	3,100	1,700	1,700	4,900	22.58	15.29	14.12	7.55
Oregon	1,450	1,560	1,590	1,570	12,400	7,800	12,600	14,100	30.65	18.08	15.00	12.48
Pennsylvania	910	920	930	930	7,400	9,200	7,200	6,800	24.46	18.48	25.28	11.18
Utah	270	130	460	280	2,700	2,200	8,000	3,600	15.56	20.91	5.00	16.39
Wisconsin	3,690	4,700	7,600	4,570	38,000	34,300	49,900	23,200	11.37	13.38	8.24	7.97
Total	14,650	16,780	19,900	17,940	135,400	135,500	145,900	120,600	17.49	16.06	11.30	10.52
Danish (late):												
New York	18,020	17,940	19,200	20,750	126,100	143,500	141,800	176,400	26.64	17.46	10.35	5.83
Other States	11,270	14,650	17,450	13,350	121,600	115,700	136,100	78,100	18.75	18.89	7.79	10.74
Total	29,290	32,590	36,650	34,100	247,700	259,200	277,900	254,500	22.77	18.10	9.10	7.34
Late (total)	43,940	49,370	56,550	52,040	383,100	394,700	423,800	375,100	20.90	17.40	9.85	8.36
Total market	105,500	122,210	121,240	127,340	758,300	860,200	787,400	[3] 859,100	23.59	20.22	21.52	10.42
FOR SAUERKRAUT												
New York	5,400	6,000	9,000	5,800	40,500	57,000	73,800	51,000	12.60	10.60	6.55	5.10
Ohio	2,250	2,700	3,300	2,200	19,600	23,200	19,100	18,900	7.10	7.15	7.20	5.60
Indiana	730	1,080	1,400	1,260	7,300	5,900	9,000	6,300	7.85	7.85	7.30	7.10
Illinois	670	670	800	550	6,200	5,000	6,200	1,600	12.40	15.10	10.00	10.60
Michigan	1,620	1,700	2,030	1,420	13,000	10,700	13,400	10,800	7.20	7.90	7.35	5.80
Wisconsin	4,000	5,500	7,200	5,000	41,200	47,300	61,200	28,500	8.20	11.00	8.50	6.20
Minnesota	430	500	540	380	4,600	4,000	4,200	2,300	7.00	7.00	7.00	6.70
Colorado	500	500	500	250	7,000	5,000	5,800	2,400	7.00	15.20	7.00	6.40
Washington	260	320	320	200	2,200	2,900	2,900	1,700	10.00	11.00	15.00	12.80
Other States [4]	1,400	1,640	2,660	1,610	12,000	12,800	15,600	10,200	12.37	11.13	10.35	8.43
U. S. total	17,260	20,610	27,750	18,670	153,600	173,800	211,200	133,700	9.54	10.21	7.77	6.03

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and sauerkraut manufacturers.

[1] Short ton.

[2] Season begins in fall of previous year.

[3] Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

[4] Other States include Arkansas, California, Iowa, Maryland, Montana, Missouri, Nebraska, Oregon, Pennsylvania, Tennessee, Utah, and Virginia.

TABLE 188.—*Cabbage: Car-lot shipments, by State of origin, 1920-1930*

State	Crop-movement season [1]										
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930 [2]
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
New York [3]	9, 511	9, 315	10, 274	9, 086	11, 816	12, 545	12, 898	14, 080	8, 636	10, 609	11, 917
Pennsylvania [3]	240	300	406	317	409	552	523	420	252	302	216
Ohio	524	318	589	538	658	414	544	765	581	555	66
Illinois	157	107	144	289	279	198	195	193	329	296	355
Michigan [3]	598	477	908	732	644	573	287	375	428	256	153
Wisconsin	4, 766	2, 908	5, 875	6, 415	4, 955	5, 409	5, 177	4, 547	6, 412	5, 395	5, 959
Minnesota	895	592	1, 192	989	1, 552	873	1, 125	1, 009	1, 493	1, 200	683
Iowa	373	150	566	390	541	265	459	435	566	442	504
Maryland	219	325	448	220	509	238	166	293	266	428	67
Virginia [4]	1, 545	3, 528	2, 937	3, 326	3, 400	2, 225	1, 814	2, 720	2, 444	3, 969	1, 772
North Carolina	49	251	222	364	275	356	341	292	254	261	214
South Carolina [4]	904	3, 247	3, 235	4, 299	1, 530	3, 421	2, 671	1, 900	2, 209	2, 549	2, 731
Florida [4]	4, 581	1, 617	2, 998	1, 172	3, 842	1, 936	1, 667	1, 051	1, 168	3, 136	2, 271
Kentucky	112	103	73	85	107	45	17	24	33	75	25
Tennessee	136	181	563	270	348	317	609	667	823	1, 256	952
Alabama	379	1, 001	1, 364	1, 564	908	1, 270	1, 586	1, 803	861	857	676
Mississippi	878	509	1, 629	1, 134	605	674	990	710	1, 249	1, 689	931
Louisiana [4]	254	313	334	456	103	644	331	592	592	549	265
Texas [4]	5, 180	1, 847	4, 049	1, 356	7, 281	4, 048	6, 093	5, 546	7, 242	7, 905	5, 347
Colorado	1, 832	2, 523	1, 964	3, 174	1, 473	1, 432	1, 274	683	1, 162	810	1, 164
Washington	114	170	104	155	52	103	154	139	82	168	85
California [4]	1, 485	788	835	684	364	650	663	360	798	512	837
Other States	364	357	520	473	430	836	794	727	847	912	1, 014
Total	35, 096	30, 927	41, 229	37, 488	42, 081	39, 024	40, 378	39, 331	38, 727	44, 131	38, 204

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

[1] Crop-movement season covers 17 months, from December through the second following April; i. e., the 1920 season begins December, 1919, and ends April, 1921.
[2] Preliminary.
[3] Figures include shipments in May of succeeding crop year as follows: N. Y., 1922, 1 car; 1926, 3 cars; 1927, 25 cars; 1930, 1 car; Pa., 1920, 1 car; Mich., 1927, 1 car; 1928, 2 cars.
[4] Figures include shipments in November of preceding crop year as follows: Virginia, 1922, 1 car; 1925, 7 cars; 1928, 1 car; 1930, 11 cars; South Carolina, 1922, 1 car; 1923, 11 cars; 1924, 24 cars; 1925, 8 cars; 1927, 10 cars; 1928, 23 cars; 1929, 3 cars; 1930, 130 cars; Florida, 1928, 5 cars; Louisiana, 1923, 2 cars; 1924, 1 car; Texas, 1920, 2 cars; 1922, 4 cars; 1923, 22 cars; 1924, 9 cars; 1925, 12 cars; 1928, 30 cars; 1929, 12 cars; 1930, 10 cars; California, 1920, 24 cars; 1921, 6 cars; 1922, 64 cars; 1923, 1 car; 1924, 2 cars; 1926, 2 cars; 1930, 1 car.

TABLE 189.—*Cantaloupes:*[1] *Car-lot shipments, by State of origin, 1920–1931*

State	Crop-movement season [2]											
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931 [3]
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
Indiana	632	644	894	681	822	1, 089	629	415	465	389	184	277
Michigan	209	232	465	306	114	146	84	77	52	16	13	16
Delaware	600	942	843	818	511	657	551	427	427	285	193	233
Maryland	781	1, 153	1, 233	1, 270	699	1, 116	1, 283	1, 159	1, 002	561	274	335
North Carolina	358	894	700	620	401	655	401	606	304	88	19	110
South Carolina	131	281	270	70	116	33	173	179	94	44	125	89
Georgia	387	619	1, 632	217	586	117	136	108	104	76	138	83
Arkansas	986	1, 554	1, 002	337	1, 052	1, 245	1, 127	788	854	413	245	446
Texas	169	156	186	387	456	498	514	242	244	176	358	753
Colorado	2, 482	3, 288	4, 420	2, 306	3, 229	3, 837	5, 108	3, 980	2, 789	4, 664	4, 088	2, 778
New Mexico	968	508	275	364	518	574	640	415	370	352	416	612
Arizona	1, 159	1, 504	1, 558	1, 208	2, 145	3, 833	3, 712	5, 217	5, 901	5, 457	5, 834	4, 542
Washington	380	208	371	207	298	221	145	252	258	382	282	150
California [4]	13, 251	13, 166	15, 304	16, 486	19, 930	18, 707	18, 320	22, 406	25, 307	26, 850	23, 626	25, 673
Other States	460	666	777	646	617	1, 091	601	486	523	289	384	423
Total	22, 953	25, 815	29, 930	25, 923	31, 494	33, 819	33, 424	36, 757	38, 694	40, 042	36, 179	36, 520

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

[1] Includes Honeydew and other miscellaneous melons. Melons other than cantaloupes were not reported separately until 1923. Shipments are as follows: 1923, 1,152 cars; 1924, 2,565 cars; 1925, 3,654 cars; 1926, 6,484 cars; 1927, 6,516 cars; 1928, 9,719 cars; 1929, 11,894 cars; 1930, 12,352 cars; 1931, 12,169 cars.
[2] Crop-movement season extends from Apr. 1 through November of a given year.
[3] Preliminary.
[4] Figures for California include shipments in December as follows: 1920, 1 car; 1925, 18 cars; 1926, 3 cars; 1927, 4 cars; 1928, 2 cars; 1930, 1 car.

TABLE 190.—*Cantaloupes,[1] commercial crop: Acreage, production, and price per crate, by States, 1928–1931*

Group and State	Acreage				Production				Seasonal farm price per crate			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	Acres	*Acres*	*Acres*	*Acres*	*1,000 crates[2]*	*1,000 crates[2]*	*1,000 crates[2]*	*1,000 crates[2]*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Early:												
California (Imperial)	33,460	38,360	50,900	51,640	6,224	6,713	5,752	7,849	1.60	1.63	1.32	1.14
Florida	920	600	600	250	37	36	30	13	2.00	2.00	1.75	1.50
Texas	140	740	1,260	540	16	70	113	59	1.20	2.00	2.25	.81
Group total	34,520	39,700	52,760	52,430	6,277	6,819	5,895	7,921	1.60	1.64	1.34	1.14
Second early:												
Arizona	10,000	11,500	15,700	13,000	1,800	2,024	2,088	1,625	1.34	1.25	.90	.85
Arkansas	6,000	2,400	2,550	2,600	564	185	115	182	1.02	1.22	.90	.88
California (other)	12,050	14,020	15,330	15,680	2,470	2,734	2,851	2,540	1.06	.95	.99	.87
Georgia	650	600	750	800	52	48	75	56	1.50	2.22	.80	.75
Nevada	250	170	150	120	50	23	14	20	.80	1.30	1.70	.84
North Carolina	2,310	1,000	620	1,100	261	70	53	99	.98	1.20	1.15	.70
Oklahoma	500	500	500	750	34	38	38	64	.89	1.25	1.10	.68
South Carolina	640	510	600	1,200	56	26	72	150	1.31	1.90	.75	.55
Texas (other)	1,570	1,500	2,320	11,530	141	111	139	[3] 865	.50	1.16	.95	.81
Group total	33,970	32,200	38,520	46,780	5,428	5,259	5,445	[3] 5,601	1.13	1.10	.95	.84
Intermediate:												
Delaware	2,400	2,400	2,400	2,760	324	240	144	317	1.00	1.50	1.70	.75
Illinois	900	900	900	1,020	97	94	63	82	1.20	1.45	1.75	1.25
Indiana	4,640	4,180	4,390	4,610	524	418	255	438	1.23	1.50	1.55	1.15
Maryland	6,040	6,800	7,010	8,150	676	578	386	734	1.21	1.45	1.55	.75
New Mexico	1,400	1,570	1,800	2,100	189	196	243	258	1.10	1.00	1.50	1.17
Tennessee	470	120	170	220	33	10	13	15	1.05	1.50	1.60	1.35
Washington	1,750	1,850	1,950	1,600	192	278	224	197	.61	.76	1.18	.75
Group total	17,600	17,820	18,620	20,460	2,035	1,814	1,328	2,041	1.11	1.31	1.50	.91
Late:												
Colorado	9,000	11,000	10,000	8,100	1,170	2,530	2,000	1,134	.94	.83	1.20	.85
Iowa	780	580	520	620	78	39	42	53	1.06	1.48	1.40	1.05
Kansas	450	450	450	450	57	54	40	50	.92	.81	1.05	.80
Michigan	3,000	3,400	3,800	4,000	300	476	608	560	1.35	1.35	1.60	1.20
Nevada	220	320	280	100	36	40	44	3	1.70	1.75	.55	.65
New Jersey	3,000	2,500	3,100	4,000	480	275	388	420	.95	1.25	1.25	1.00
Ohio	------	300	360	540	------	27	41	57	------	1.75	1.85	1.09
Oregon	------	600	800	700	------	60	120	122	------	1.00	1.25	.75
Group total	16,450	19,150	19,310	18,510	2,121	3,501	3,283	2,399	1.02	.96	1.28	.96
Total all States	102,540	108,870	129,210	138,180	15,861	17,393	15,951	[3] 17,962	1.30	1.31	1.21	1.00

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

[1] Includes Honeyball, Honeydew, Casaba, and Persian melons not separately reported.
[2] Standard crates (45's) containing approximately 60 pounds.
[3] Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

TABLE 191.—*Carrots, commercial crop for market: Acreage, production, and price per bushel, 1928–1931*

Marketing group	Acreage				Production				Seasonal farm price to Dec. 1, per bushel			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	Acres	*Acres*	*Acres*	*Acres*	*1,000 bush.[1]*	*1,000 bush.[1]*	*1,000 bush.[1]*	*1,000 bush.[1]*	*Cents*	*Cents*	*Cents*	*Cents*
Fall	1,840	2,900	3,950	4,340	861	1,595	2,267	2,543	63	70	70	60
Early	6,450	7,540	7,810	8,230	1,354	1,885	1,438	[2] 2,123	48	31	35	41
Second early	6,270	8,730	7,650	10,660	2,154	[2] 3,514	3,093	[2] 4,484	67	62	76	52
Intermediate	2,490	2,200	2,150	1,710	525	538	[2] 706	[2] 573	95	98	91	79
Late	3,070	5,350	6,390	5,400	1,209	2,693	3,158	2,110	96	58	40	45
Total	20,120	26,720	27,950	30,340	6,103	[2] 10,225	[2] 10,662	[2] 11,833	70	58	59	53

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

[1] Bushels containing approximately 50 pounds.
[2] Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

TABLE 192.—*Carrots: Car-lot shipments by State of origin, 1920–1930*

State	Crop-movement season [1]										
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930 [2]
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
New York	1,158	1,247	1,523	1,410	2,262	1,825	1,845	2,430	1,484	2,111	[3] 2,233
New Jersey	32	32	26	34	18	48	44	85	67	12	14
Illinois	53	62	82	24	3	23	2	13	96	33	37
Michigan	11	33	25	35	55	54	77	91	208	204	141
Virginia	3	1	10	2	1	40	10	44	137	110	67
Mississippi	77	81	304	142	266	197	209	496	230	108	28
Louisiana	28	43	62	58	32	106	70	177	99	71	84
Texas	5	198	48	65	282	575	1,136	903	1,685	2,860	2,145
Colorado	1	9	4	12	26	29	62	10	216	96	43
California	111	19	21	24	157	278	557	2,363	2,938	6,095	7,206
Other States	123	115	151	173	212	252	290	241	295	449	439
Total	1,602	1,840	2,256	1,979	3,314	3,427	4,302	6,853	7,455	12,149	12,437

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

[1] Crop-movement season begins in October of the previous year in such early shipping States as California, Louisiana, and Texas, and extends through June of the following year in order to include shipments from storage in Northern States and to have totals comparable with acreage and production figures.
[2] Preliminary.
[3] Includes 45 cars in July, 1931.

TABLE 193.—*Celery, commercial crop: Acreage, production, and price per crate, 1928–1931*

Marketing group	Acreage				Production				Seasonal farm price to Dec. 1, per crate			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	Acres	*Acres*	*Acres*	*Acres*	*1,000 crates* [1]	*1,000 crates* [1]	*1,1000 crates* [1]	*1,000 crates* [1]	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Fall and winter	7,400	7,000	7,620	7,060	999	1,512	1,257	1,278	1.09	1.08	1.00	1.04
Early	6,580	7,620	7,800	7,580	2,753	2,877	3,243	3,107	2.69	2.14	2.00	2.37
Second early	450	850	800	1,100	264	604	616	610	1.94	2.28	1.60	1.86
Intermediate	3,280	3,750	3,210	2,650	966	1,046	882	639	1.75	1.72	1.74	1.75
Late (sec. 1)	10,140	11,320	13,030	13,330	2,964	2,932	3,954	3,638	1.50	1.44	1.12	1.68
Late (sec. 2)	1,210	1,330	1,480	1,630	299	447	467	478	1.24	1.69	1.28	1.50
Total	29,060	31,870	33,940	33,350	8,245	9,418	10,419	9,750	1.88	1.69	1.46	1.82

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

[1] Two-thirds size (New York) crates containing approximately 90 pounds.

TABLE 194.—*Celery: Car-lot shipments, by State of origin, 1920–1930*

State	Crop-movement season [1]										
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930 [2]
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
New York	3,110	3,047	3,247	3,742	4,529	4,492	4,898	5,893	4,192	3,847	5,451
New Jersey	94	219	115	219	177	149	138	106	32	53	32
Pennsylvania	186	224	212	223	225	208	194	169	71	105	81
Michigan	954	1,031	1,626	1,486	1,332	2,224	1,880	1,997	2,139	1,852	1,606
Florida	2,652	4,218	4,954	6,398	7,219	7,952	5,504	7,499	8,413	8,831	9,838
Idaho	22	9	26	49	48	29	19	46	121	262	287
Colorado	305	211	222	125	197	399	211	161	188	149	136
Oregon	16	53	82	205	363	398	511	625	605	673	647
California	2,005	3,469	2,625	4,419	4,748	4,554	6,226	7,696	8,384	9,580	8,430
Other States	48	77	102	82	99	109	80	125	135	138	69
Total	9,392	12,558	13,211	16,948	18,937	20,514	19,661	24,317	24,280	25,490	26,627

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

[1] Crop movement season covers 20 months, from September through the second following April; i. e., the 1920 season begins September, 1919, and ends April, 1921.
[2] Preliminary.

TABLE 195.—*Cherries: Production in 10 States,*[1] *imports, and exports 1924–1931*

Year	Production											Imports, year beginning July 1			Exports, canned,[2] year beginning July 1
	New York	Michigan	Wisconsin	Montana	Idaho	Colorado	Utah	Washington	Oregon	California	10 States	Natural, in brine	Prepared or preserved	Total	
	Short tons	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
1924	17, 500	16, 500	9, 550	265	1, 700	750	3, 800	4, 800	10, 400	13, 500	78, 765	4, 937	9, 175	14, 112	1, 612
1925	15, 300	11, 600	3, 550	310	2, 400	3, 900	5, 500	8, 400	7, 200	12, 000	70, 160	2, 904	11, 153	14, 057	1, 688
1926	16, 400	13, 800	9, 700	385	3, 200	7, 600	5, 300	10, 500	15, 100	20, 000	101, 985	5, 733	15, 974	21, 707	2, 111
1927	10, 500	6, 800	3, 150	350	1, 300	4, 500	3, 800	4, 100	11, 300	12, 000	57, 800	15, 136	1, 048	16, 184	1, 719
1928	9, 600	21, 500	10, 250	130	3, 100	1, 650	4, 600	9, 700	11, 500	18, 500	90, 530	13, 173	384	13, 557	2, 202
1929	14, 670	15, 750	4, 600	720	3, 100	5, 100	3, 200	15, 550	8, 500	16, 300	87, 490	22, 362	866	23, 228	1, 897
1930	25, 000	21, 100	5, 200	560	3, 200	3, 500	3, 500	16, 500	12, 640	17, 500	108, 700	7, 926	1, 280	9, 206	1, 232
1931[3]	17, 000	22, 500	6, 000	590	3, 000	2, 500	2, 000	10, 000	9, 000	23, 000	95, 590	------	------	------	------

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board. Trade figures compiled from Monthly Summary of Foreign Trade of the United States, June issues. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

[1] Estimates include only certain States where total production can be calculated from commercial sales (shipments, canning, cold pack, etc.) and differs from previously published commercial estimates for some States by an increased allowance for farm and local use.
[2] Fresh cherries not separately reported.
[3] Preliminary.

TABLE 196.—*Citrus-fruit production, by States, 1899, 1909, 1919–1931* [1]

Year	Oranges								Grapefruit					Lemons	Limes
	7 States	California	Florida[2]	Texas	Arizona	Alabama[3]	Louisiana	Mississippi	4 States	California	Florida[2]	Texas	Arizona	California	Florida
	1,000 boxes	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*
1899[4]	6, 167	5, 882	273	------	11	(5)	1	------	31	18	12	------	1	874	------
1909[4]	19, 530	14, 440	4, 888	11	33	1	152	5	1, 186	123	1, 062	(5)	1	2, 756	11
1919	22, 842	15, 265	7, 400	9	80	20	37	31	6, 095	263	5, 800	3	29	3, 499	28
1920	30, 005	21, 296	8, 500	------	60	82	42	25	5, 738	304	5, 400	------	34	4, 955	------
1921	20, 582	12, 640	7, 700	------	80	82	50	30	6, 795	360	6, 400	------	35	4, 050	------
1922	30, 671	20, 106	10, 200	4	81	175	60	45	8, 073	394	7, 600	35	44	3, 400	------
1923	37, 484	24, 137	12, 900	6	86	225	75	55	8, 893	363	8, 400	65	65	6, 732	------
1924	29, 847	18, 100	11, 600	12	60	(5)	75	0	9, 265	387	8, 600	211	67	5, 125	36
1925	33, 623	24, 200	9, 100	10	86	100	100	27	8, 190	600	7, 300	200	90	7, 316	30
1926	39, 229	28, 167	10, 700	20	75	75	150	42	8, 865	650	7, 800	340	75	7, 712	12
1927	31, 644	23, 000	8, 200	30	54	110	200	50	8, 586	720	7, 200	490	176	6, 000	0
1928	54, 160	38, 705	15, 000	68	99	38	220	30	12, 455	972	10, 500	772	211	7, 900	6
1929	34, 034	24, 400	8, 800	261	137	212	187	37	11, 095	1, 000	8, 200	1, 530	365	5, 900	8
1930	54, 559	35, 000	19, 000	220	139	3	195	2	18, 690	1, 250	16, 000	1, 040	400	7, 950	8
1931[6]	50, 814	34, 900	15, 000	400	145	70	245	54	14, 770	1, 400	11, 000	1, 920	450	8, 000	9

Bureau of Agricultural Economics. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

[1] The figures in this table of production include fruit consumed on farms, sold locally and used for manufacturing purposes, as well as that shipped. The figures do not include fruit which ripened on the trees, but which was destroyed by freezing or storms prior to picking. For California the figures relate to the crop produced from the bloom of the year shown, fruiting through the winter and through the spring and summer of the following year, being picked from Nov. 1 of the year shown to Oct. 31 of the following year. Fruit not picked until after the latter date is included with the crop of the following year. For all States except California the estimates include all fruit picked after about Sept. 1 of the year shown. The estimates for oranges include tangerines.
[2] From prospects on Dec. 1, commercial shipments of Florida citrus fruits from the 1931 crop were estimated at 12,500,000 boxes of oranges, and 8,000,000 boxes of grapefruit, compared with 16,000,000 boxes of oranges and 11,200,000 boxes of grapefruit shipped from the 1930 crop.
[3] For years 1919–1931, equivalent in standard boxes, each equal to about 2 of the "half straps" commonly used.
[4] Census. Size of boxes not specified.
[5] 500 boxes or less.
[6] As estimated from prospects on Dec. 1.

TABLE 197.—*Citrus fruits: Car-lot shipments, by State of origin, 1921–22 to 1930–31*

ORANGES [1]

State	Crop-movement season [2]									
	1921–22	1922–23	1923–24	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31[3]
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
California	28, 376	48, 346	44, 905	34, 439	47, 017	53, 511	43, 693	68, 797	43, 053	64, 432
Florida	[4]15, 718	23, 006	33, 418	25, 091	19, 625	22, 536	16, 453	32, 480	17, 312	33, 884
Alabama	145	476	600	2	338	179	312	97	485	2
Mississippi	-------	9	13	-------	8	4	15	5	25	1
Louisiana	-------	-------	3	2	1	1	251	264	278	155
Texas	-------	-------	3	3	6	9	26	33	156	119
Arizona	78	71	94	45	96	73	33	66	90	90
Total	[4]44, 317	71, 908	79, 036	59, 582	67, 091	76, 313	60, 783	101,742	61, 399	98, 683

GRAPEFRUIT

State	1921–22	1922–23	1923–24	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31
Florida	12, 943	16, 969	19, 614	20, 087	14, 269	17, 304	14, 166	21, 839	13, 955	26, 072
Texas	8	48	99	521	298	747	1, 036	1, 617	3, 493	2, 247
California	503	507	469	449	546	597	756	822	1, 179	1, 103
Arizona	62	103	155	159	218	210	211	272	417	436
Louisiana	-------	-------	-------	-------	-------	-------	-------	-------	1	2
Total	13, 516	17, 627	20, 337	21, 216	15, 331	18, 858	16, 169	24, 550	19, 045	29, 860

LEMONS

State	1921–22	1922–23	1923–24	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31
California	9, 907	8, 946	13, 388	11, 680	13, 981	13, 496	12, 745	17, 181	13, 564	18, 396
Texas	-------	-------	1	[5]2	-------	-------	-------	-------	-------	-------
Arizona	-------	1	2	1	1	-------	-------	-------	2	1
Total	9, 907	8, 947	13, 391	11, 683	13, 982	13, 496	12, 745	17, 181	13, 566	18, 397

MIXED CITRUS [6]

State	1921–22	1922–23	1923–24	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31
Florida	-------	2, 631	3, 608	4, 226	3, 565	5, 313	6, 225	9, 109	8, 216	14, 683
California	-------	1, 033	1, 461	1, 148	1, 605	1, 639	1, 590	1, 783	1, 343	1, 618
Texas	-------	18	1	18	-------	22	92	185	501	288
Arizona	-------	3	-------	10	1	10	11	24	48	29
Louisiana	-------	-------	-------	-------	-------	-------	1	1	10	155
Total	-------	3, 685	5, 070	5, 402	5, 171	6, 984	7, 919	11, 102	10, 118	16, 773

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

[1] Include tangerines.
[2] Crop-movement season extends as follows: California, from Nov. 1 through October of the following year, except for grapefruit which extends from Sept. 1 through August of the following year; all other States from Sept. 1 through August of the following year, except for lemons, from Nov. 1 through October of the following year.
[3] Preliminary.
[4] Includes 1 car in August, 1921.
[5] Reported in October, 1924.
[6] No reports available before 1922.

TABLE 198.—*Lemons: International trade, average 1925–1929, annual 1927–1930*

Country	Calendar year									
	Average, 1925–1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*
Italy	6,971	0	7,345	0	6,609	0	6,817	0	8,036	0
Spain	474	0	383	0	340	0	618	0	690	------
Total	7,445	0	7,728	0	6,949	0	7,435	0	8,726	0
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom	0	1,857	0	1,827	0	1,655	0	1,965	0	2,171
Germany [2]	24	1,682	29	1,741	28	1,665	23	1,859	28	2,158
United States	257	999	308	849	251	943	267	634	206	1,056
Belgium [3]	4	456	4	95	4	90	5	1,173	7	2,137
Czechoslovakia	0	436	0	483	0	382	0	459	0	480
Canada	0	351	0	352	0	385	0	370	0	379
Poland	0	297	0	308	0	288	0	351	0	263
Rumania	[4] 0	[4] 220	0	235	------	------	------	------	------	------
Netherlands	28	182	29	187	35	170	36	188	34	238
Hungary	0	172	0	216	0	202	0	196	0	197
Switzerland	0	154	0	153	0	165	0	167	0	205
Yugoslavia	0	139	0	147	0	144	0	135	------	173
Total	313	6,945	370	6,593	318	6,089	331	7,497	275	9,457

Bureau of Agricultural Economics. Official sources.

[1] Preliminary.
[2] Includes oranges and similar fruits in exports.
[3] Includes oranges and similar fruits, except for imports for 1927 and 1928.
[4] 3-year average.

TABLE 199.—*Lemons, California: Weighted average auction price per box, New York, by months, 1924–25 to 1931–32*

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1924–25	------	------	4.47	4.45	4.59	4.75	5.73	6.84	4.66	4.67	8.55	6.83	------
1925–26	4.13	4.46	3.91	4.16	5.40	4.12	4.83	3.79	4.83	4.38	3.56	4.50	4.35
1926–27	3.82	4.03	4.20	3.43	3.90	3.50	3.89	4.50	6.44	6.37	8.82	9.27	4.64
1927–28	6.92	6.13	6.33	6.03	5.19	5.54	6.42	6.04	6.97	6.11	5.59	5.19	6.07
1928–29	4.90	5.62	5.26	3.95	4.07	4.55	3.82	6.89	5.39	7.82	11.87	11.22	5.82
1929–30	8.70	8.63	5.68	5.06	4.81	5.51	7.24	6.15	7.26	7.93	5.36	4.23	6.42
1930–31	4.18	4.52	4.89	4.08	4.47	4.06	4.43	5.05	6.57	6.55	7.28	5.66	5.30
1931–32	3.98	4.04	------	------	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from reports of California Fruit Growers Exchange. Prices weighted by number of boxes sold. These prices are a new series and are not comparable with those published in Yearbooks prior to 1930.

TABLE 200.—*Grapefruit, Florida: Weighted average auction price per box, New York, by months, 1924–25 to 1931–32*

Crop season	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1924–25	------	------	------	2.83	2.83	2.71	3.78	4.38	5.94	(1)	------
1925–26	4.96	3.97	3.95	4.01	4.03	4.61	5.16	4.70	4.74	5.51	4.38
1926–27	5.35	4.07	3.40	3.58	3.75	3.67	3.59	3.66	3.80	2.44	3.66
1927–28	4.60	4.70	4.71	4.82	5.07	5.52	5.45	4.92	3.93	6.28	[2] 4.93
1928–29	4.41	4.25	3.44	3.52	3.20	3.30	3.32	3.83	4.71	6.36	3.70
1929–30	4.51	4.23	4.26	4.43	4.09	4.78	5.09	4.25	3.24	3.10	[3] 4.42
1930–31	3.64	3.00	2.82	2.56	2.43	2.50	2.76	2.57	2.06	1.17	[4] 2.09
1931–32	3.09	2.60	2.26	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from reports of California Fruit Growers Exchange. Prices weighted by number of boxes sold. These prices are a new series and are not comparable with those published in Yearbooks prior to 1930.

[1] Reported for one week only.
[2] Includes a price in August, 1928, of $4.51.
[3] Includes a price in September, 1929, of $5.80.
[4] Includes a price in September, 1930, of $4.03.

TABLE 201.—*Oranges: International trade, average 1925–1929, annual 1927–1930*

Country	Calendar year									
	Average 1925–1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*
Spain	20,935	1	17,538	0	24,268	3	22,407	1	30,654	0
Italy	3,435	0	4,410	0	2,245	0	2,608	0	3,744	0
United States	3,285	14	3,562	19	2,678	24	5,512	0	2,236	0
Palestine	[2] 2,123	0	2,645	0	2,151	0	1,813	0	2,998	0
Union of South Africa	734	0	749	0	694	0	1,002	0	1,763	0
Brazil	571	0	397	0	605	0	1,096	0	1,076	0
Japan	449	0	479	0	464	0	440	0	378	0
Cuba	120	0	33	0	0	0	0	0	9	0
Total	31,652	15	29,813	19	33,105	27	34,878	1	42,858	0
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom	0	11,307	0	10,975	0	10,753	0	12,859	0	13,774
Germany	0	6,259	0	5,941	0	7,340	0	6,741	0	9,946
France [3]	81	3,793	57	3,668	106	4,008	21	3,700	26	5,851
Canada	0	2,237	0	2,544	0	2,212	0	3,128	0	2,163
Netherlands	591	1,833	527	1,631	666	1,938	743	2,027	821	2,581
Belgium	------	[4] 829	------	671	------	947	------	------	------	------
China	292	462	313	461	332	416	353	549	328	315
Switzerland	0	440	0	419	0	494	0	476	0	652
Czechoslovakia	0	416	0	417	0	384	0	390	0	791
Norway [3]	0	391	0	387	0	426	0	434	0	549
Sweden	0	357	0	360	0	399	0	440	1	747
Egypt	4	345	3	394	5	250	5	264	5	382
Hungary	0	293	0	351	0	360	0	296	0	414
Poland	0	256	0	210	0	134	0	123	1	146
Irish Free State	0	255	0	255	0	258	0	282	0	326
Denmark	0	234	0	224	0	244	0	242	0	308
Yugoslavia	0	161	0	163	0	179	0	180	0	253
Total	968	29,868	900	29,071	1,109	30,742	1,122	32,131	1,182	39,198

Bureau of Agricultural Economics. Official sources.

[1] Preliminary. [2] 4-year average. [3] Includes some lemons. [4] 3-year average.

TABLE 202.—*Oranges, California, Navel: Weighted average auction price per box, New York, by months, 1924–25 to 1931–32*

Crop season	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1924–25	--------	--------	4.64	4.47	5.35	5.48	6.51	6.21	--------
1925–26	8.00	4.56	4.24	4.55	4.70	5.50	4.73	5.56	4.80
1926–27	6.32	5.06	4.69	4.71	4.54	4.89	4.43	5.60	4.74
1927–28	(1)	5.55	4.56	5.18	5.52	5.98	7.39	--------	--------
1928–29	5.72	4.46	4.84	3.89	3.52	4.06	3.56	3.56	4.10
1929–30	(1)	5.56	4.98	4.99	5.67	6.03	6.64	--------	--------
1930–31	5.23	3.58	3.45	3.27	3.42	3.32	3.93	(1)	--------
1931–32	3.87	3.30	--------	--------	--------	--------	--------	--------	--------

Bureau of Agricultural Economics. Compiled from reports of California Fruit Growers Exchange. Prices weighted by number of boxes sold. These prices are a new series and are not comparable with those published in Yearbooks prior to 1930.

[1] Reported for 1 week only.

TABLE 203.—*Oranges, California Valencia: Weighted average auction price per box, New York, by months, 1925–1931*

Crop season	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Average [1]
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1925	4.80	6.28	7.43	6.40	6.47	7.58	8.23	9.90	7.15
1926	4.92	4.58	4.46	5.21	4.89	5.39	6.44	6.79	5.28
1927	4.66	4.43	4.98	5.90	6.15	6.73	7.02	6.71	6.00
1928	5.94	7.38	7.22	7.58	7.45	7.77	7.53	6.79	7.45
1929	(2)	4.40	4.58	4.13	4.85	4.73	4.85	4.77	4.63
1930	6.59	7.97	7.19	7.36	7.33	7.29	8.69	7.78	7.59
1931		3.42	3.62	4.31	3.81	3.86	4.50	3.79	

Bureau of Agricultural Economics. Compiled from reports of California Fruit Growers Exchange. Prices weighted by number of boxes sold. These prices are a new series and are not comparable with those published in Yearbooks prior to 1930.

1 Includes prices in December as follows: 1925, $2.14; 1926, $6.69; 1927, $5.75; 1929, $4.85.
2 Reported for 1 week only.

TABLE 204.—*Oranges, Florida: Weighted average auction price per box, New York, by months, 1924–25 to 1931–32*

Crop season	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average [1]
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1924–25				3.68	4.26	5.69	6.43	7.82	8.26	
1925–26	7.45	7.19	4.00	4.25	4.44	5.02	5.80	5.87	6.72	5.10
1926–27	3.70	4.79	3.53	3.76	3.91	4.10	4.86	4.75	4.54	4.11
1927–28	3.67	6.31	5.59	5.23	5.97	6.29	6.84	8.58	9.11	6.24
1928–29	5.08	3.71	3.55	3.45	3.30	3.30	3.55	3.33	2.99	3.40
1929–30	3.42	4.04	4.21	4.49	4.44	4.98	7.13	7.42	6.60	4.94
1930–31	4.76	3.45	3.01	2.91	3.19	3.79	3.80	3.85	4.02	3.54
1931–32	2.64	3.20	3.11							

Bureau of Agricultural Economics. Compiled from reports of California Fruit Growers Exchange. Prices weighted by number of boxes sold. These prices are a new series and are not comparable with those published in Yearbooks prior to 1930.

1 Includes prices in other months as follows: 1926–27, $3.12 in July; 1928–29, $2.92 in July, and $2.29 in August; 1930–31, $2.61 in Sept., 1930, and $4.62 in July, 1931.

TABLE 205.—*Corn, sweet, commercial crop for manufacture: Acreage, production, and price per ton,[1] by States, 1928–1931*

State	Acreage				Production				Seasonal farm price per ton			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	Acres	*Acres*	*Acres*	*Acres*	*Tons*	*Tons*	*Tons*	*Tons*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Maine	10,770	14,850	13,200	10,200	30,200	46,000	48,800	35,700	24.70	24.70	26.30	19.30
New Hampshire	1,110	1,320	1,050	900	2,600	3,300	3,200	2,600	23.70	23.80	23.10	18.40
Vermont	1,940	2,370	2,100	1,280	4,700	6,200	4,800	3,200	18.30	18.20	17.70	12.40
New York	27,000	24,600	23,000	17,300	32,400	36,900	29,900	43,200	16.50	17.00	17.50	17.00
Pennsylvania	4,140	6,000	6,300	5,500	4,100	6,000	5,000	9,400	13.80	15.00	16.00	13.50
Ohio	27,910	31,000	32,500	30,300	39,100	62,000	35,800	72,700	10.80	11.20	11.30	9.90
Indiana	27,390	38,500	43,500	38,000	38,300	50,000	56,600	83,600	13.00	13.00	13.20	11.00
Illinois	58,300	64,000	72,000	68,600	128,300	134,400	144,000	164,600	12.70	12.80	13.00	10.60
Michigan	8,930	6,400	7,300	6,900	16,100	6,400	4,400	7,600	12.40	12.50	13.00	11.70
Wisconsin	14,780	11,600	13,000	12,500	29,600	24,400	31,200	28,800	11.50	11.80	11.10	10.10
Minnesota	33,000	45,800	54,000	48,700	85,800	109,900	129,600	88,100	10.80	11.00	10.40	10.10
Iowa	39,800	50,000	55,000	53,800	99,600	125,000	110,000	123,700	9.30	9.90	10.50	9.50
Nebraska	5,470	5,740	7,750	6,400	9,800	10,900	10,800	10,900	9.40	10.00	10.00	8.70
Delaware	4,060	3,900	3,630	3,100	7,300	5,800	6,500	7,800	12.00	13.00	13.00	10.50
Maryland	35,500	44,000	34,000	39,800	53,200	61,600	23,800	71,600	14.00	15.00	14.50	11.70
Tennessee	3,100	3,400	3,400	3,600	5,300	6,800	6,800	9,000	14.00	14.60	15.10	16.00
Other States [2]	2,700	3,830	3,830	3,680	6,500	8,800	8,500	9,400	13.85	13.95	13.95	11.90
U. S. total	305,960	357,310	375,560	350,560	592,900	704,400	659,700	771,800	12.68	13.14	13.24	11.32

Bureau of Agricultural Economics. Estimates based upon returns from canning establishments.

1 Tonnage in husk.
2 Other States include Colorado, Idaho, Kentucky, Missouri, Montana, Oregon, South Dakota, Utah, Washington, and Wyoming.

TABLE 206.—*Corn, canned: Pack* [1] *in the United States, 1919–1931*

State	Season												
	1919	1920	1921	1922	1923	1924	1295	1926	1927	1928	1929	1930	1931
	1,000 cases	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*
Maine	1, 652	1, 588	911	1, 066	923	1, 294	1, 693	1, 347	806	966	1, 521	1, 930	1, 245
New York	1, 014	829	564	616	434	749	1, 311	1, 038	676	666	782	647	1, 080
Ohio	1, 360	1, 544	850	1, 073	1, 390	787	2, 375	1, 735	846	1, 138	1, 551	750	1, 871
Indiana	586	861	709	665	1, 208	846	2, 223	2, 044	703	1, 131	1, 250	1, 272	2, 362
Illinois	2, 225	2, 271	1, 711	1, 939	2, 833	2, 310	4, 030	3, 053	1, 961	3, 017	3, 153	3, 261	3, 788
Wisconisn	635	590	576	625	648	388	1, 148	843	310	578	547	686	712
Minnesota	456	643	573	598	898	1, 199	1, 541	1, 762	1, 088	1, 648	2, 604	2, 912	1, 835
Iowa	2, 496	3, 246	1, 190	1, 959	2, 382	1, 764	4, 105	3, 361	1, 377	2, 541	2, 908	2, 552	3, 227
Maryland	2, 081	2, 217	1, 130	1, 944	2, 256	1, 707	3, 678	2, 133	1, 493	1, 648	1, 865	622	1, 956
Other States	1, 045	1, 251	629	934	1, 134	1, 087	2, 216	1, 753	1, 087	1, 164	1, 306	1, 060	1, 339
United States	13, 550	15, 040	8, 843	11, 419	14, 106	12, 131	24, 320	19, 069	10, 347	14, 497	17, 487	15, 692	19, 415

Bureau of Agricultural Economics. Compiled from National Canners' Association data, 1919–1926; Bureau of Census, 1927–1929; beginning 1930, Foodstuffs Division, Bureau of Foreign and Domestic Commerce.

[1] Stated in cases of 24 No. 2 cans.

TABLE 207.—*Cranberries: Production and December 1 price, by States, 1926–1931*

State	Production						Price per barrel received by producers					
	1926	1927	1928	1929	1930	1931 [1]	1926	1927	1928	1929	1930	1931
	Bbls.	*Bbls.*	*Bbls.*	*Bbls.*	*Bbls.*	*Bbls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Massachusetts	430, 000	370, 000	335, 000	400, 000	370, 000	450, 000	7. 75	12. 50	15. 00	13. 25	10. 00	6. 00
New Jersey	210, 000	75, 000	138, 000	90, 000	144, 000	142, 000	7. 00	11. 00	13. 00	12. 00	9. 75	5. 50
Wisconsin	80, 000	24, 000	50, 000	42, 000	40, 000	45, 000	8. 00	13. 50	16. 00	13. 50	12. 50	7. 00
Washington	16, 600	21, 000	22, 000	11, 000	3, 480	9, 000	7. 80	12. 00	13. 50	14. 25	12. 75	7. 50
Oregon	7, 000	6, 000	6, 000	5, 800	3, 000	5, 000	7. 50	10. 50	13. 50	14. 50	13. 50	7. 50
United States	743, 600	496, 000	551, 000	548, 800	560, 480	651, 000	7. 56	12. 28	14. 51	13. 10	10. 15	5. 99

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board. Prices are based upon returns from crop reporters.

[1] Preliminary.

TABLE 208.—*Cucumbers, commercial crop: Acreage, production and price per bushel 1928–1931*

Utilization	Acreage				Production				Seasonal farm price per bushel			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	Acres	*Acres*	*Acres*	*Acres*	*1,000 bush.* [1]	*1,000 bush.* [1]	*1,000 bush.* [1]	*1,000 bush.* [1]	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
For market	41, 830	41, 200	56, 420	52, 460	4, 456	4, 598	[2] 6, 186	[2] 4, 781	1. 28	1. 73	1. 10	0. 75
For pickles	76, 790	80, 370	117, 690	85, 220	4, 902	4, 037	7, 656	5, 976	. 84	. 82	. 79	. 63
Total	118, 620	121, 570	174, 110	137, 680	9, 358	8, 635	[2] 13, 842	[2] 10, 757	1. 05	1. 31	. 81	. 67

Bureau of Agricultural Economics. Estimates based upon return from crop reporters and pickle manufacturers.

[1] Bushels containing approximately 48 pounds.
[2] Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

TABLE 209.—*Figs: Production and value, California, 1922–1931*

Year	Figs, dried			Figs, marketed fresh and canned		
	Production	Seasonal farm price	Farm value	Production	Seasonal farm price	Farm value
	Short tons	*Dollars*	*1,000 dolls.*	*Short tons*	*Dollars*	*1,000 dolls.*
1922	11,000	120.00	1,320			
1923	9,500	90.00	855			
1924	8,500	100.00	850	2,135	104.00	222
1925	9,600	110.00	1,056	3,075	100.00	308
1926	11,350	95.00	1,078	5,100	112.00	571
1927	12,000	45.00	540	5,400	100.00	540
1928	11,500	45.00	518	6,130	87.00	533
1929	17,000	90.00	1,530	7,300	100.00	730
1930	21,000	48.00	1,008	7,700	90.00	693
1931 [1]	17,000	[2] 37.00	629	6,300	[2] 74.00	466

Bureau of Agricultural Economics.

[1] Preliminary. [2] Seasonal average price to Dec. 1.

TABLE 210.—*Grapes: Production, farm price, imports and exports, United States, 1922–1931*

Year	Production			United States seasonal farm price per ton [1]	United States value, basis seasonal farm price [1]	Foreign trade, year beginning July [2]			
	Total, United States	California	Other States			United States domestic exports	United States imports	United States net exports [3]	
								Total	Percentage of production
	Short tons	*Short tons*	*Short tons*	*Dollars*	*Dollars*	*Short tons*	*Short tons*	*Short tons*	*Per cent*
1922	1,981,171	1,706,000	275,171	48.09	95,271,520	7,011	16,326	[4] 9,315	
1923	2,227,395	2,030,000	197,395	31.88	71,009,078	10,128	10,015	198	(5)
1924	1,777,722	1,535,000	242,722	41.79	74,297,480	10,151	1,608	8,566	0.5
1925	[6] 2,202,085	[6] 2,050,000	152,085	32.03	66,115,000	12,134	1,415	10,735	.5
1926	[6] 2,438,413	[6] 2,129,000	309,413	26.66	64,604,000	15,396	1,011	14,414	.6
1927	[6] 2,605,238	[6] 2,406,000	199,238	26.52	65,332,000	19,410	1,735	17,747	.7
1928	[6] 2,671,076	[6] 2,366,000	305,076	19.75	49,740,000	27,819	1,703	26,155	1.0
1929	2,080,045	1,827,000	253,045	26.88	55,915,000	23,079	2,687	20,448	1.0
1930	[6] 2,438,514	[6] 2,181,000	257,514	18.97	44,040,000	24,900	2,856	22,108	.9
1931 [7]	[6] 1,582,982	[6] 1,287,000	295,982	22.94	36,081,000				

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board. Prices are based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 census. Earlier years not so revised.

[1] For years 1925–1931, the average price for the States reporting price, except California, is used for computing the value of the grape crop in the less important States for which no price is determined. Price and value are based on quantities actually harvested plus a quantity of fruit that was sold but left on the vines in 1930 and 1931.

[2] Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1923–1926; January and June issues, 1927–1931.

[3] Total exports (domestic plus foreign) minus total imports.

[4] Net import equals total imports minus total exports (domestic plus foreign).

[5] Less than 0.05 per cent.

[6] Includes fruit in California not harvested as follows: 138,000 tons in 1925, 15,000 in 1926, 142,000 in 1927, 153,000 in 1928, 433,000 in 1930, and 10,000 in 1931. (See also last sentence of Note 1.)

[7] Preliminary.

TABLE 211.—*Grapes: Car-lot shipments, by State of origin, 1920–1931*

State	Crop-movement season [1]											
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931 [2]
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
New York	5,904	2,535	7,720	4,312	5,641	3,763	7,242	3,050	3,752	2,541	2,049	4,215
Pennsylvania	1,223	390	1,558	847	1,166	589	1,350	689	1,076	879	809	1,282
Michigan	5,046	1,292	6,020	4,202	4,680	398	3,081	2,023	1,571	1,746	1,620	525
Iowa	104	77	237	217	79	50	176	196	234	369	226	184
Missouri	27	4	128	58	101	166	686	108	415	225	316	337
Arkansas	14	3	38	33	243	394	1,170	108	998	510	322	313
Washington	8	64	47	62	83	191	125	167	235	232	117	94
California [3]	28,832	33,344	43,952	55,348	57,695	76,066	64,327	75,925	73,157	59,205	65,185	39,270
Other States	152	108	219	257	245	261	433	411	332	395	271	186
Total	41,310	37,817	59,919	65,336	69,933	81,878	78,590	82,677	81,770	66,102	70,915	46,406

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car-lots include those by boat reduced to car-lot basis.

[1] Crop movement season extends from June 1 through December of a given year.
[2] Preliminary.
[3] Figures include shipments in succeeding crop year as follows: 1920, January, 1 car; 1921, January, 2 cars; 1922, January 7 cars; 1923, January, 13 cars; 1924, January, 6; cars February, 2 cars; 1925, January, 21 cars; 1926, January, 2 cars; February, 1 car; 1927, January, 7 cars; February, 2 cars; 1928, January, 31 cars; February, 8 cars; March, 1 car; 1929, January, 6 cars; 1930, January, 30 cars; February, 1 car.

TABLE 212.—*Grapes: Number of packages of California varieties sold, and weighted seasonal average price, auction sales in 11 markets,[1] 1926–1931*

	Number of packages (crates and lugs)						Average price per package					
	1926 [2]	1927 [3]	1928 [4]	1929 [5]	1930 [6]	1931 [7]	1926	1927	1928	1929	1930	1931
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Tokay	2,495	2,785	2,762	1,855	2,489	1,591	1.43	1.40	1.34	1.42	1.15	1.59
Emperor	333	236	103	56	41	991	1.38	1.15	1.15	1.62	1.06	1.61
Red Malaga	(8)	(8)	(8)	113	119	157	(8)	(8)	(8)	2.20	1.79	1.93
Ribier	(8)	(8)	(8)	89	152	184	(8)	(8)	(8)	1.86	1.67	1.71
Thompson	1,752	2,531	2,484	2,713	2,377	1,555	1.16	1.36	1.05	1.48	1.28	1.53
Malaga	3,737	3,719	3,129	2,027	2,096	2,976	1.21	1.22	1.17	1.37	1.08	1.22
Muscat	2,429	4,660	4,888	2,754	2,455	931	1.02	1.02	.81	1.06	1.08	1.18
Alicante	3,167	4,475	4,966	4,759	5,123	3,480	1.65	1.59	1.22	1.29	1.11	1.16
Carignane	774	1,313	1,711	541	1,973	1,654	1.47	1.32	1.06	1.14	.97	1.11
Cornichon	625	575	558	314	267	264	1.22	1.17	1.05	1.26	.98	1.26
Mataro	193	299	320	193	176	172	1.37	1.30	.96	1.14	1.13	.99
Mission	499	530	585	270	283	308	1.31	1.06	.88	1.23	.91	1.15
Petit Syrah	244	316	365	257	235	113	1.27	1.35	.96	1.15	1.11	.92
Zinfandel	1,017	1,592	1,680	1,402	1,112	624	1.22	1.30	1.00	1.14	1.06	1.05
Total or average	17,265	23,031	23,551	17,141	18,628	15,000	1.31	1.30	1.08	1.29	1.11	1.29

Bureau of Agricultural Economics. Compiled from daily reports of the fruit and vegetable market news service. Principal varieties only shown.

[1] Baltimore, Boston, Chicago, Cincinnati, Cleveland, Detroit, Minneapolis, New York, Philadelphia, Pittsburgh, and St. Louis.
[2] Aug. 5 to Nov. 6.
[3] Aug. 2 to Nov. 12.
[4] July 19 to Nov. 30.
[5] Aug. 5 to Nov. 9.
[6] Aug. 4 to Nov. 8.
[7] July 22 to Dec. 18.
[8] 1926, 1927, and 1928 not available.

TABLE 213.—*Grapes: Estimated production and seasonal farm price by States, 1926–1931*

State and division	Production						Seasonal farm price per ton [1]					
	1926	1927	1928	1929	1930	1931 [2]	1926	1927	1928	1929	1930	1931
	Short tons	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Maine	49	58	76	32	32	28						
New Hampshire	96	91	91	58	51	50						
Vermont	36	45	36	38	42	44						
Massachusetts	616	555	476	403	432	384						
Rhode Island	212	152	190	271	250	250						
Connecticut	1, 275	1, 087	1, 314	1, 404	1, 404	1, 295	55. 00					
New York	106, 700	51, 520	85, 470	79, 500	76, 670	98, 700	35. 00	61. 00	46. 00	46. 00	36. 00	22. 00
New Jersey	2, 820	2, 535	2, 822	2, 774	3, 017	3, 088	50. 00	62. 00	47. 00	50. 00	40. 00	
Pennsylvania	25, 110	14, 850	22, 680	21, 562	25, 180	33, 950	34. 00	61. 00	46. 00	47. 00	43. 00	22. 00
North Atlantic	136, 914	70, 893	113, 155	106, 142	107, 078	137, 789						
Ohio	29, 100	20, 000	28, 700	14, 121	20, 300	26, 600	40. 00	60. 00	59. 00	62. 00	40. 00	26. 00
Indiana	4, 606	2, 580	4, 980	2, 438	2, 700	3, 400	45. 00	65. 00	60. 00	62. 00	40. 00	38. 00
Illinois	6, 532	3, 440	6, 800	6, 000	4, 320	6, 800	50. 00	70. 00	60. 00	64. 00	44. 00	44. 00
Michigan	60, 900	51, 700	72, 800	58, 911	66, 400	53, 100	35. 00	45. 00	37. 00	41. 00	33. 00	28. 00
Wisconsin	409	250	495	338	300	380						
Minnesota	85	152	198	299	194	330						
Iowa	6, 052	5, 329	6, 225	7, 946	5, 803	6, 700	50. 00	56. 00	51. 00	70. 00	65. 00	56. 00
Missouri	12, 880	7, 000	14, 000	8, 601	7, 500	10, 280	45. 00	50. 00	45. 00	69. 00	60. 00	40. 00
Nebraska	1, 584	1, 955	1, 920	2, 917	2, 632	2, 360		54. 00	60. 00	70. 00	70. 00	50. 00
Kansas	3, 700	3, 735	3, 465	4, 589	3, 205	4, 500	60. 00	50. 00	55. 00	70. 00	70. 00	50. 00
North Central	125, 848	96, 141	139, 583	106, 160	113, 354	114, 450						
Delaware	1, 536	1, 207	1, 600	2, 357	2, 268	2, 164						
Maryland	1, 330	1, 225	1, 200	646	673	682						
Virginia	2, 790	2, 048	2, 560	1, 786	1, 590	1, 980			50. 00	65. 00	80. 00	80. 00
West Virginia	1, 696	720	1, 422	853	804	1, 304						
North Carolina	6, 840	5, 135	6, 000	3, 718	3, 880	4, 620	50. 00	50. 00	45. 00	65. 00	80. 00	80. 00
South Carolina	1, 785	1, 540	1, 725	811	994	1, 031						
Georgia	1, 892	1, 472	1, 672	721	808	869						
Florida	700	610	900	912	900	1, 010						
South Atlantic	18, 569	13, 957	17, 079	11, 804	11, 917	13, 660						
Kentucky	1, 274	632	1, 200	729	665	1, 090						
Tennessee	1, 672	950	1, 363	941	950	1, 215						
Alabama	913	627	759	605	650	720						
Mississippi	300	225	259	218	244	281						
Arkansas	13, 000	3, 000	17, 000	7, 818	7, 200	10, 000	38. 00	65. 00	57. 00	60. 00	50. 00	40. 00

Louisiana	42	30	38	46	46	57						
Oklahoma	1,800	1,732	2,100	2,745	2,275	2,550			66.00	66.00	60.00	58.00
Texas	1,200	1,260	1,440	1,954	1,650	1,840						
South Central	20,201	8,456	24,164	15,056	13,680	17,753						
Idaho	300	304	298	528	565	530						
Colorado	320	314	357	482	290	280						
New Mexico	531	458	600	1,083	700	1,000						
Arizona	900	1,900	1,785	1,957	1,680	1,900						
Utah	1,300	1,320	1,520	1,040	1,200	950						
Nevada	230	270	210	90	100	70						
Washington	2,500	3,200	4,300	6,035	4,800	5,100	45.00	56.00	40.00	40.00	35.00	22.00
Oregon	1,800	2,025	2,025	2,668	2,150	2,500	55.00	55.00	40.00	40.00	33.00	24.00
California	[3] 2,129,000	[3] 2,406,000	[3] 2,366,000	1,827,000	[3] 2,181,000	[3] 1,287,000	25.00	24.00	16.06	23.75	16.30	21.55
Wine varieties	414,000	473,000	482,000	417,000	486,000	337,000			25.00	35.00	20.00	19.00
Raisin varieties	1,317,000	1,443,000	1,406,000	1,098,000	1,307,000	729,000			10.00	16.28	13.94	18.53
Dried	272,000	285,000	261,000	215,000	192,000	157,000			40.00	61.00	59.00	70.00
Not dried	229,000	303,000	362,000	238,000	540,000	101,000			10.00	20.00	12.80	24.90
Table varieties	398,000	490,000	478,000	312,000	388,000	221,000			26.00	35.00	20.83	35.30
Western	2,136,881	2,415,791	2,377,095	1,840,883	2,192,485	1,299,330						
United States	[3] 2,438,413	[3] 2,605,238	[3] 2,671,076	2,080,045	[3] 2,438,514	[3] 1,582,982	26.66	26.52	19.75	26.88	18.97	22.94

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

[1] The average price for the States reporting price, except California, is used for computing the value of the grape crop in the less important States for which no price is determined. Prices and value are computed on the harvested crop plus a quantity of fruit that was sold but left on the vines in 1930 and 1931.

[2] Preliminary.

[3] The totals shown for California include some fruit not harvested on account of market conditions as follows: Grapes, wine varieties, 1928, 18,000 tons, 1930, 40,000 tons, 1931, 10,000 tons; grapes, raisin varieties not dried, 1928, 60,000 tons, 1930, 319,000 tons; grapes, table varieties, 1926, 15,000 tons, 1927, 142,000 tons, 1928, 75,000 tons, 1930, 74,000 tons.

TABLE 214.—*Grapes, Concord: Average l. c. l. price to jobbers in 12-quart baskets, specified markets, by State of origin, October, 1924–1931*

Year	New York Concord				Michigan Concord		
	Boston	New York	Philadelphia	Pittsburgh	Chicago	Minneapolis	St. Louis
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1924	91	84	90	85	68	----------	72
1925	102	114	104	109	109	118	----------
1926	61	62	56	60	43	67	56
1927	56	61	64	64	55	76	65
1928	60	54	49	51	44	59	53
1929	50	54	51	48	41	56	49
1930	57	51	54	48	41	53	56
1931	----------	36	34	29	32	44	42

Bureau of Agricultural Economics. Compiled from daily market reports from bureau representatives in the various markets.

TABLE 215.—*Lettuce: Car-lot shipments, by State of origin, 1920–1931*

State	Crop-movement season [1]											
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931 [2]
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
New York	1,775	3,240	3,167	3,817	3,698	3,821	3,019	3,496	3,140	3,704	3,219	3,282
New Jersey	208	469	572	456	416	463	303	308	144	169	27	18
North Carolina	207	445	622	718	714	537	540	447	477	363	364	498
South Carolina	121	716	987	576	424	736	372	369	241	310	169	278
Florida	2,666	2,910	2,899	2,926	2,490	2,190	707	950	880	1,117	560	940
Idaho	25	180	889	1,241	533	500	398	196	72	76	154	177
Colorado	129	234	812	1,436	1,036	3,096	2,795	2,848	2,368	2,109	1,610	997
Arizona	248	114	577	834	1,776	2,689	4,572	7,679	9,325	9,285	8,431	7,850
Washington	354	635	812	1,082	673	820	904	1,151	1,240	1,747	2,230	1,770
California	5,997	9,223	10,321	13,916	17,040	20,999	25,126	28,502	32,122	33,854	38,736	35,211
Other states	412	531	654	791	661	658	541	400	319	286	218	152
Total	12,142	18,697	22,312	27,793	29,461	36,509	39,277	46,346	50,328	53,020	55,718	51,173

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

[1] Crop movement season begins in October of the previous year and extends through December of the given year, i. e., 1920 season begins in October, 1919, and extends through December, 1920.
[2] Preliminary.

TABLE 216.—*Lettuce, commercial crop: Acreage, production, and price per crate, by States, 1928–1931*

Group and State	Acreage				Production				Seasonal farm price per crate			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	Acres	*Acres*	*Acres*	*Acres*	*1,000 crates*[1]	*1,000 crates*[1]	*1,000 crates*[1]	*1,000 crates*[1]	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Early:[2]												
Arizona	12,700	16,500	14,000	18,100	1,664	1,766	1,260	1,267	0.98	1.60	2.30	1.20
California (Imperial)	22,000	27,250	38,100	41,000	3,740	4,006	4,267	3,649	1.62	2.09	1.74	1.56
Florida	1,840	2,000	1,560	2,450	498	635	507	646	1.61	1.18	1.92	.78
Lettuce	1,500	1,500	1,100	1,600	345	405	248	371	1.70	1.29	2.20	.80
Escarole	340	500	460	850	153	230	259	275	1.40	1.00	1.65	.76
Texas	1,000	800	740	300	100	160	24	22	1.02	1.00	1.00	1.00
Group total	37,540	46,550	54,400	61,850	6,002	6,567	6,058	5,584	1.43	1.84	1.87	1.39
Second early:												
Arizona	13,500	11,000	23,000	16,000	1,418	1,727	1,725	1,280	1.88	2.85	1.45	1.06
California (other)	24,500	26,150	31,570	31,600	3,479	2,693	3,062	3,729	1.39	1.86	2.02	1.42
North Carolina	1,490	1,160	1,400	1,500	171	136	130	201	1.60	1.65	.98	.60
South Carolina	750	600	450	600	112	104	59	93	2.11	1.83	2.16	1.24
Group total	40,240	38,910	56,420	49,700	5,180	4,660	4,976	5,303	1.55	2.22	1.80	1.30
Intermediate:												
Idaho	50	60	70	70	5	9	14	9	1.67	2.25	1.40	1.25
New Jersey	1,200	1,000	950	1,000	270	200	142	250	1.70	1.90	1.86	1.20
Oregon	50	70	80	80	7	6	8	6	1.25	1.30	1.05	.80
Virginia	300	280	200	200	60	57	28	36	1.45	1.00	2.00	1.75
Washington	1,850	2,500	3,350	3,000	370	525	670	600	1.00	1.27	.75	.77
Group total	3,450	3,910	4,650	4,350	712	797	862	901	1.31	1.42	.99	.93
Late (Sec. 1):												
California	7,800	9,630	12,700	12,800	975	1,194	1,651	1,536	2.16	2.12	1.93	2.36
Colorado	8,800	8,100	7,440	6,650	1,012	891	670	598	1.07	1.25	.85	1.30
New Mexico	430	250	200	200	30	20	16	22	1.35	1.20	1.05	.90
New York	4,460	5,800	5,450	5,050	1,004	1,740	1,499	1,010	2.68	1.13	1.05	1.45
Pennsylvania	80	80	80	80	9	12	11	13	2.70	1.20	1.05	1.50
Group total	21,570	23,860	25,870	24,780	3,030	3,857	3,847	3,179	1.96	1.46	1.39	1.86
Late (Sec. 2):												
California	19,120	24,500	29,750	34,200	3,174	4,067	3,540	3,317	2.24	1.74	1.89	1.50
Idaho	280	290	340	380	41	42	54	57	1.67	.75	1.00	1.10
New Jersey	1,100	700	650	1,000	165	150	156	100	2.26	2.20	1.76	1.20
Oregon	50	50	50	250	4	5	5	38	1.25	1.30	.80	.95
Washington	350	350	450	450	70	72	90	90	1.25	1.50	.95	1.05
Wyoming	40	40	40	------	3	3	3	------	1.82	1.30	.90	------
Group total	20,940	25,930	31,280	36,280	3,457	4,339	3,848	3,602	2.21	1.74	1.85	1.47
Total all States	123,740	139,160	172,620	176,960	18,381	20,220	19,591	18,569	1.69	1.82	1.71	1.44

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

[1] Western crates containing 4 dozen heads. [2] Season begins in fall of the previous year.

TABLE 217.—*Olives: Production and value, California, 1922–1931*

Year	Production	Seasonal farm price	Farm value	Year	Production	Seasonal farm price	Farm value
	Short tons	*Dollars*	*1,000 dollars*		*Short tons*	*Dollars*	*1,000 dollars*
1922	10,000	125.00	1,250	1927	21,500	80.00	1,720
1923	17,000	65.00	1,105	1928	23,900	80.00	1,912
1924	6,500	92.00	598	1929	21,000	75.00	1,575
1925	14,000	60.00	840	1930	20,000	70.00	1,400
1926	12,000	80.00	960	1931 [1]	16,000	[2] 54.00	864

Bureau of Agricultural Economics.

[1] Preliminary. [2] Seasonal average price to Dec. 1.

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TABLE 218.—*Olive oil (including inedible): International trade, average 1925–1929, annual 1927–1930*

Country	Calendar year									
	Average 1925–1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Spain	164, 975	2	122, 252	0	263, 197	0	113, 251	0	235, 678	0
Italy	66, 494	1, 769	76, 527	1, 221	29, 697	3, 509	79, 298	313	159, 208	128, 662
Tunis	53, 947	1, 458	56, 770	486	30, 880	2, 485	95, 803	11	109, 301	151
Greece	28, 599	[2] 123	20, 389	-------	20, 215	82	31, 709	-------	18, 514	-------
Algeria	28, 466	115	13, 190	85	48, 096	38	28, 505	162	54, 152	67
Turkey [3]	18, 185	[4] 198	23, 845	193	5, 034	42	33, 928	520	10, 452	4
Syria and Lebanon [3]	4, 283	339	8, 622	312	904	295	5, 618	180	6, 397	413
Morocco	4, 206	282	142	306	10, 375	186	6, 802	417	3	1, 361
Yugoslavia	1, 077	861	1, 289	559	1, 120	1, 319	2, 239	400	322	542
Total	370, 232	5, 147	323, 026	3, 162	409, 518	7, 956	397, 153	2, 003	594, 027	131, 200
PRINCIPAL IMPORTING COUNTRIES										
United States	0	135, 847	0	124, 152	0	131, 214	0	153, 005	0	162, 860
Argentina [3]	0	95, 334	0	77, 066	0	116, 417	0	112, 309	0	130, 715
France	13, 958	40, 146	17, 151	27, 467	17, 508	40, 286	14, 347	49, 186	27, 659	78, 442
United Kingdom	324	19, 100	392	18, 980	273	20, 727	338	20, 541	269	21, 179
Cuba	0	16, 654	0	12, 919	0	18, 927	0	16, 831	0	21, 644
Chile	0	14, 103	0	[3] 12, 231	0	26, 679	0	7, 796	0	6, 739
Uruguay	0	13, 410	0	10, 326	0	16, 577	0	13, 790	0	18, 753
Brazil	0	12, 808	0	9, 661	0	20, 005	0	9, 814	0	18, 399
Norway	0	7, 098	0	7, 006	0	7, 163	0	10, 453	0	5, 883
Macao (Portuguese China) [3]	[4] 2, 331	[4] 6, 813	1, 859	5, 280	837	6, 395	-------	-------	-------	-------
Portugal	5, 722	6, 659	3, 409	23, 722	13, 541	362	3, 331	2, 246	[3] 8, 020	[3] 26, 510
Palestine	710	5, 726	2, 140	4, 421	479	7, 835	361	7, 666	1, 147	2, 148
Canada	0	4, 044	0	4, 448	0	5, 132	0	4, 732	0	6, 487
Switzerland	2	3, 443	7	2, 881	0	3, 734	0	3, 701	0	4, 847
Egypt	32	2, 666	30	1, 911	35	2, 195	26	2, 946	24	3, 907
Germany	53	2, 631	50	2, 438	55	2, 919	87	2, 600	50	3, 393
Mexico	0	2, 230	0	1, 520	0	2, 508	0	[3] 2, 304	0	3, 827
Rumania	1	[4] 1, 871	4	2, 083	0	-------	2	1, 480	0	1, 549
Australia [3]	1	1, 545	1	1, 351	0	1, 841	0	1, 996	2	2, 530
Belgium	33	1, 319	17	796	46	1, 313	11	1, 127	23	1, 659
Peru	0	1, 272	0	917	0	1, 667	0	1, 528	-------	-------
Bulgaria	0	1, 227	0	1, 031	0	598	0	483	-------	507
Czechoslovakia	24	958	62	911	5	1, 119	1	1, 071	2	1, 207
Sweden	4	454	5	312	4	452	2	601	3	810
Japan	0	330	0	309	0	[3] 322	0	[3] 349	0	-------
Philippine Islands	0	312	0	328	0	271	0	346	0	292
Netherlands	7	181	17	150	4	209	3	185	16	280
New Zealand	0	173	0	141	0	273	0	166	0	312
Denmark	6	154	4	209	7	116	6	194	[3] 5	[3] 341
Total	23, 208	398, 508	25, 148	354, 967	32, 794	437, 256	18, 515	429, 446	37, 220	525, 250

Bureau of Agricultural Economics. Official sources except where otherwise noted. Conversions made on the basis of 7.5 pounds to the gallon.

[1] Preliminary.
[2] 2-year average.
[3] International Yearbook of Agricultural Statistics.
[4] 4-year average.

TABLE 219.—*Onions, commercial crop: Acreage, production, and price per bushel, by States, 1928–1931*

Group and State	Acreage				Production				Seasonal farm price to Dec. 1, per bushel			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Early (Bermuda and Creole):	*Acres*	*Acres*	*Acres*	*Acres*	*1,000 bush.*[1]	*1,000 bush.*[1]	*1,000 bush.*[1]	*1,000 bush.*[1]	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
California	3, 950	3, 450	2, 050	1, 250	[2] 980	869	570	339	0. 77	1. 25	0. 98	0. 95
Louisiana	2, 310	2, 180	1, 260	1, 100	293	277	77	94	. 89	1. 09	1. 16	1. 19
Texas	18, 280	19, 700	16, 310	17, 200	3, 546	3, 763	3, 360	[2] 3, 492	1. 10	1. 02	. 70	. 73
Group total	24, 540	25, 330	19, 620	19, 550	[2] 4, 819	4, 909	4, 007	[2] 3, 925	1. 03	1. 06	. 75	. 77
Intermediate (domestic):												
California	780	840	940	1, 100	299	373	466	483	. 75	. 45	. 48	. 57
Iowa, Scott Co. Dist.	1, 000	1, 000	1, 050	1, 050	288	260	336	194	. 88	. 86	. 91	. 85
Kentucky	800	600	510	400	320	48	18	150	. 45	. 43	. 75	. 70
New Jersey	2, 700	2, 000	2, 200	2, 400	702	490	396	660	1. 00	1. 20	1. 00	. 85
Texas, Collin Co. District	2, 000	1, 170	1, 350	1, 810	760	302	279	452	. 56	1. 27	. 94	. 78
Virginia, E. Shore	500	700	560	560	92	119	56	84	. 51	1. 15	1. 00	. 70
Washington, Walla Walla Co.	700	810	850	800	290	405	412	304	. 40	. 63	. 56	. 50
Group total	8, 480	7, 120	7, 460	8, 120	2, 751	1, 997	1, 963	2, 327	. 70	. 89	. 76	. 72
Late (domestic):												
California	5, 300	6, 040	6, 680	5, 300	1, 569	1, 727	[2] 2, 017	1, 463	1. 28	. 86	. 61	. 83
Colorado	3, 760	7, 000	5, 600	4, 050	1, 241	[2] 2, 583	1, 725	923	1. 42	. 45	. 32	. 74
Idaho	1, 000	1, 000	1, 700	1, 500	700	475	629	825	1. 14	. 50	. 30	. 90
Illinois	740	770	750	690	169	212	188	110	1. 22	. 70	. 72	. 90
Indiana	8, 510	8, 400	9, 120	7, 750	2, 042	2, 436	3, 493	1, 318	1. 60	. 56	. 37	. 70
Iowa, other	1, 760	1, 900	2, 000	1, 500	579	627	680	262	1. 15	. 60	. 48	. 90
Massachusetts	3, 500	2, 950	2, 730	2, 520	840	1, 136	1, 147	970	1. 01	. 85	. 63	. 90
Michigan	5, 000	5, 700	6, 700	6, 260	1, 350	2, 029	2, 767	1, 171	1. 40	. 62	. 43	. 75
Minnesota	1, 740	2, 160	2, 650	1, 900	632	756	702	380	1. 28	. 60	. 37	. 80
Nevada	------	150	130	120	------	32	43	25	------	. 64	. 42	. 84
New York	5, 830	7, 910	8, 000	8, 200	1, 283	3, 243	3, 576	2, 780	1. 35	. 75	. 45	. 85
Ohio	6, 550	6, 600	5, 400	5, 300	891	1, 650	1, 404	874	1. 60	. 55	. 42	. 70
Oregon	950	1, 040	1, 080	1, 100	361	406	486	468	1. 43	. 60	. 32	. 85
Pennsylvania	350	340	350	350	86	94	86	91	1. 10	. 90	. 70	. 90
Utah	1, 000	1, 100	1, 200	700	520	475	398	305	1. 20	. 50	. 35	. 65
Washington, other	710	850	950	900	373	408	428	405	1. 12	. 53	. 30	. 80
Wisconsin	1, 100	980	940	870	385	294	263	235	1. 25	. 69	. 55	. 75
Group total	47, 800	54, 890	55, 980	49, 010	13, 021	[2] 18,583	[2] 20,032	12, 605	1. 35	. 63	. 43	. 80
Total domestic	56, 280	62, 010	63, 440	57, 130	15, 772	[2] 20,580	[2] 21,995	14, 932	1. 23	. 66	. 46	. 79
Total all States	80, 820	87, 340	83, 060	76, 680	[2] 20,591	[2] 25,489	[2] 26,002	[2] 18,857	1. 19	. 74	. 51	. 79

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

[1] Bushels containing approximately 57 pounds.

[2] Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

TABLE 220.—*Onions: United States imports, by countries, annual, 1920–21 to 1930–31*

Year beginning July—	Netherlands	Spain	Italy	United Kingdom	Canada	Canary Islands	Bermuda	Mexico	Chile	Australia	Egypt	Other countries	Total
	1,000 bush.	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*
1921–22	40	1, 522	74	247	66	18	34	26	43	119	243	56	2, 488
1922–23	33	990	11	157	42	13	18	20	1	3	447	48	1, 783
1923–24	(1)	1, 098	17	52	1	8	9	29	30	4	148	10	1, 406
1924–25	60	1, 090	19	71	29	7	9	18	79	8	618	67	2, 075
1925–26	11	1, 342	100	36	11	4	9	20	26	3	599	33	2, 194
1926–27	48	1, 084	65	59	9	2	9	1	76	8	912	25	2, 298
1927–28	11	701	35	12	2	1	3	(1)	213	3	392	26	1, 399
1928–29	580	1, 007	145	26	4	2	(1)	11	134	4	105	32	2, 050
1929–30	5	768	42	11	(1)	1	(1)	(1)	49	2	38	2	918
1930–31	0	177	24	1	2	0	(1)	0	10	0	0	0	214

Bureau of Agricultural Economics. Compiled from official records of the Bureau of Foreign and Donestic Commerce.

[1] Less than 500 bushels.

TABLE 221.—*Onions: Car-lot shipments, by State of origin, 1920–21 to 1930–31*

State	Crop-movement season [1]										
	1920–21	1921–22	1922–23	1923–24	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31 [2]
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
Massachusetts	3, 914	2, 244	1, 912	2, 454	2, 481	2, 856	3, 586	2, 495	1, 416	1, 854	1, 474
New York	3, 384	2, 890	2, 812	5, 505	5, 335	5, 109	3, 720	4, 102	1, 807	3, 985	4, 226
New Jersey	371	429	479	335	403	235	253	295	333	239	193
Ohio	3, 239	1, 749	4, 493	2, 714	4, 492	1, 856	2, 287	4, 070	1, 774	2, 988	2, 293
Indiana	4, 124	1, 972	4, 684	4, 610	3, 735	4, 158	4, 493	5, 000	3, 939	5, 195	6, 879
Illinois	409	251	487	378	241	291	158	142	180	142	193
Michigan	939	417	1, 867	1, 222	1, 623	1, 402	2, 171	2, 653	2, 664	2, 964	5, 499
Wisconsin	409	90	330	273	212	361	270	279	294	241	219
Minnesota	287	169	500	189	487	674	684	1, 289	1, 077	1, 448	1, 141
Iowa	830	416	927	882	1, 176	1, 365	1, 434	1, 333	1, 430	1, 492	1, 762
Virginia	139	280	371	274	345	138	178	131	178	234	109
Kentucky	304	382	258	263	266	152	134	145	69	59	12
Texas	4, 957	4, 209	4, 630	3, 027	3, 918	3, 941	5, 316	4, 028	7, 081	7, 232	6. 312
Idaho	28	50	161	256	322	876	531	891	1, 152	731	677
Colorado	150	447	651	928	1, 064	1, 809	1, 758	1, 460	2, 244	4, 042	2, 124
Utah	9	54	170	177	216	599	662	654	1, 029	950	551
Washington	810	702	765	1, 126	1, 016	1, 000	1, 200	1, 302	1, 153	1, 417	1, 464
Oregon	27	343	263	392	558	681	678	671	663	660	730
California	4, 802	3, 542	3, 631	4, 145	2, 671	3, 603	3, 013	3, 753	4, 492	4, 144	4, 062
Other States	340	254	369	330	235	540	536	499	351	264	147
Total	29, 472	20, 890	29, 760	29, 480	30, 796	31, 646	33, 062	35, 192	33, 326	40, 281	40, 067

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in carlots include those by boat reduced to car-lot basis.

[1] Crop movement season extends from Mar. 1 of one year through June of the following year.
[2] Preliminary.

TABLE 222.—*Peaches: Total production, average price per bushel, and foreign trade of the United States, 1913–1931*

Year	Production	Price per bushel, received by producers [3]	Farm value	Domestic exports, year beginning July 1 [2]			
				Fresh	Dried	Canned [4]	Total in terms of fresh
	1,000 bushels	*Dollars*	*1,000 dollars*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 bushels*
1913	39, 707	----	----	----	6, 712	----	736
1914	54, 109	----	----	----	14, 465	----	1, 586
1915	64, 097	----	----	----	13, 739	----	1, 507
1916	37, 505	----	----	----	8, 188	----	898
1917	48, 765	----	----	----	5, 863	----	643
1918	33, 094	1. 62	53, 637	----	4, 835	----	530
1919	*50, 686*						
1919	53, 178	1. 89	100, 485	----	12, 756	----	1, 399
1920	45, 620	2. 10	95, 970	----	3, 573	----	392
1921	32, 602	1. 59	51, 739	[5] 611	6, 260	----	699
1922	55, 852	1. 34	74, 717	13, 170	5, 586	54, 624	3, 163
1923	45, 382	1. 37	62, 025	15, 065	12, 975	50, 374	3, 835
1924	*47, 755*						
1924	53, 848	1. 26	68, 084	16, 172	4, 668	57, 390	3, 240
1925	46, 562	1. 38	64, 171	15, 749	3, 351	83, 160	4, 161
1926	[6] 69, 865	1. 00	68, 426	14, 453	6, 968	81, 896	4, 477
1927	[6] 45, 463	1. 18	50, 494	17, 969	6, 542	86, 634	4, 701
1928	[6] 68, 369	. 99	63, 643	22, 067	12, 436	101, 438	6, 050
1929	45, 026	1. 35	60, 982	19, 973	3, 847	74, 470	3, 941
1930	[6] 53, 864	. 89	43, 825	12, 859	8, 482	75, 763	4, 355
1931 [7]	[6] 77, 743	. 56	41, 377	----	----	----	----

Bureau of Agricultural Economics. Production figures are estimates of the crop-reportnig board; italic figures are census returns. Prices based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

[1] Dried peaches converted to terms of fresh on the basis that dried peaches equal 19 per cent of fresh. Canned peaches converted to terms of fresh on the basis that 25 pounds of fresh equal 1 dozen cans of 1 pound each; 48 pounds fresh equals 1 bushel. In practice, 1 bushel of fresh fruit is figured as the equivalent of 2 dozen cans of 1 pound each.

[2] Compiled from Commerce and Navigation of the United States, 1913–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1926, January and June issues, 1927–1931.

[3] From 1918 to 1922, Sept. 15 price; 1923–1925, Sept. 15 price in North, Aug. 15 price in South; 1926–1931, approximate average price for the season, as reported Dec. 1.

[4] Canned peaches were reported in value only prior to July 1, 1922.

[5] No exports reported prior to Jan. 1, 1922; figures for 1921 represent exports Jan. 1, 1922, to June 30, 1922.

[6] Includes fruit not harvested as follows: 1926, 1,462,000 bushels in Georgia and northern States; 1927, 2,708,000 bushels in California; 1928, 2,917,000 bushels in California and 1,000,000 bushels in Georgia; 1930, 10,638,000 bushels in California; 1931, 8,063,000 bushels in California. Values are based on the quantity actually harvested plus a quantity of fruit that was sold but left on trees in 1930 and 1931.

[7] Preliminary.

TABLE 223.—*Peaches: Production and seasonal form price, by States, 1925–1931*

State and division	Production							Seasonal farm price per bushel [1]						
	1925	1926	1927	1928	1929	1930	1931 [2]	1925	1926	1927	1928	1929	1930	1931
	1,000 bush.	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
New Hampshire	34	29	26	25	17	24	26	2.00	1.50	2.20	2.40	2.00	2.00	1.55
Massachusetts	218	213	140	189	131	185	153	2.50	1.80	2.10	2.30	2.10	1.60	1.25
Rhode Island	30	37	23	27	29	32	41	3.00	1.70	2.10	2.30	2.50	1.80	1.40
Connecticut	210	255	186	239	154	249	210	2.80	1.70	2.20	1.90	2.00	1.30	1.40
New York	1,920	2,300	1,140	2,400	1,076	1,580	1,700	1.90	.90	1.90	1.45	1.80	1.15	.65
New Jersey	1,740	3,000	2,304	1,625	1,990	1,340	2,200	1.50	.70	1.50	1.35	1.15	1.70	.65
Pennsylvania	600	2,498	947	1,867	1,234	1,025	2,720	2.40	1.00	2.00	1.55	1.75	1.70	.65
North Atlantic	4,752	8,332	4,766	6,372	4,631	4,435	7,050	1.89	.92	1.75	1.50	1.53	1.48	.69
Ohio	1,100	2,120	1,326	1,742	478	300	2,500	2.15	1.25	1.95	1.55	1.95	1.95	.55
Indiana	320	900	242	605	978	12	1,470	2.30	1.60	2.35	1.60	1.60	2.00	.55
Illinois	500	2,660	1,122	1,638	3,320	(3)	4,300	2.50	1.25	2.05	1.40	1.35	-----	.50
Michigan	592	1,564	578	1,156	998	780	1,935	2.20	1.00	2.10	1.55	1.90	1.65	.60
Iowa	12	97	65	50	77	9	117	2.50	1.60	1.95	1.50	1.50	1.70	.90
Missouri	870	1,722	340	655	864	24	1,500	1.80	1.25	1.90	1.55	1.40	1.95	.65
Nebraska	33	50	82	6	52	25	60	2.35	1.50	1.60	2.00	1.65	1.90	1.05
Kansas	371	266	259	84	256	35	350	1.85	1.70	1.75	1.90	1.55	1.75	.90
North Central	3,798	9,379	4,014	5,936	7,023	1,185	12,232	2.11	1.26	2.00	1.52	1.52	1.74	.57
Delaware	155	450	287	100	401	190	500	1.55	.85	1.10	1.20	1.10	1.60	.45
Maryland	240	700	352	465	655	300	800	1.85	.75	1.50	1.30	1.20	1.50	.60
Virginia	362	1,176	400	880	1,058	270	1,600	1.90	1.00	1.60	1.40	1.00	1.60	.60
West Virginia	100	1,000	202	810	489	122	1,030	2.20	1.25	2.10	1.50	1.55	1.80	.55
North Carolina	1,500	2,250	1,300	2,590	1,400	1,800	3,128	1.60	.90	1.70	1.15	1.40	1.35	.65
South Carolina	740	1,054	615	1,363	690	1,190	1,784	1.35	1.00	1.50	1.10	1.35	1.35	.70
Georgia	7,304	9,400	5,943	10,000	3,700	5,500	9,134	1.40	.80	1.35	.90	1.15	1.15	.55
Florida	115	125	69	112	66	72	92	1.65	1.60	1.75	1.35	1.70	1.20	.95
South Atlantic	10,516	16,155	9,168	16,320	8,459	9,444	18,068	1.46	.88	1.44	.97	1.22	1.26	.59
Kentucky	570	1,110	180	1,035	530	70	1,280	1.75	1.30	1.90	1.25	1.45	1.75	.55
Tennessee	1,415	1,860	638	2,190	1,325	600	2,820	1.55	1.05	1.70	1.10	1.25	1.35	.50
Alabama	1,312	1,159	540	1,350	505	1,105	1,530	1.60	1.10	1.50	1.10	1.30	1.20	.65
Mississippi	712	551	279	635	560	638	1,060	1.55	1.40	1.65	1.45	1.50	1.45	.75
Arkansas	2,200	2,400	1,628	3,000	1,900	84	3,600	1.50	1.05	1.40	1.20	1.20	1.60	.55
Louisiana	275	228	86	211	195	142	352	2.00	1.50	1.80	1.60	1.70	1.75	1.05
Oklahoma	950	180	760	480	1,116	80	400	1.33	1.30	1.30	1.30	1.00	1.30	.90
Texas	1,750	2,310	800	1,612	2,073	750	1,581	1.50	1.10	1.60	1.30	1.25	1.40	.90
South Central	9,184	9,798	4,911	10,513	8,204	3,469	12,623	1.54	1.13	1.51	1.21	1.25	1.36	.64
Idaho	23	297	144	335	183	15	170	1.90	1.00	1.60	1.05	1.35	2.00	.75
Colorado	450	976	892	650	953	787	1,130	1.90	1.10	1.20	1.20	1.45	1.45	.50
New Mexico	156	131	40	46	109	60	103	1.75	1.80	2.20	1.95	1.80	1.90	1.15
Arizona	65	91	55	66	68	88	80	1.70	1.70	2.30	2.00	1.80	1.80	1.45
Utah	100	550	561	612	604	370	550	2.00	.90	1.20	.95	1.00	1.35	.50
Nevada	8	8	2	5	6	6	3	2.25	1.50	2.30	2.00	2.25	2.00	2.00
Washington	870	1,222	250	1,470	1,225	556	1,050	1.85	.90	1.75	1.00	1.35	1.35	.65
Oregon	222	384	160	292	227	280	224	1.80	1.20	1.60	1.40	1.70	1.15	1.10
California	16,418	22,542	20,500	25,752	13,334	33,169	24,460	.86	.94	.60	.55	1.36	.54	.43
Clingstone	8,960	13,625	13,417	17,252	7,459	22,585	16,751	-----	-----	-----	-----	1.64	.48	.39
Freestone	7,458	8,917	7,083	8,500	5,875	10,584	7,709	-----	-----	-----	-----	1.00	.66	.50
Western	18,312	26,201	22,604	29,228	16,709	35,331	27,770	.96	.95	.68	.56	1.36	.60	.46
United States	46,562	[4] 69,865	[4] 45,463	[4] 68,369	45,026	[4] 53,864	[4] 77,743	1.38	1.00	1.18	.99	1.35	.89	.56

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board. Prices are based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

[1] In 1925, Sept. 15 price in North, Aug. 15 price in South; 1926–1931, approximate average price for the season as reported Dec. 1.

[2] Preliminary.

[3] Crop failure.

[4] Includes fruit not harvested as follows: 1926, 1,462,000 bushels in Georgia and Northern States; 1927, 2,708,000 bushels in California; 1928, 2,917,000 bushels in California and 1,000,000 bushels in Georgia; 1930, 10,638,000 bushels in California; 1931, 8,063,000 bushels in California. Values are based on the quantity actually harvested plus a quantity of fruit that was sold but left on trees in 1930 and 1931.

TABLE 224.—*Peaches: Car-lot shipments, by State of origin, 1928–1931 and total United States shipments, 1921–1931* [1]

State	1928	1929	1930	1931 [2]						
				Total	May	June	July	Aug.	Sept.	Oct.
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
Massachusetts		5	3							
Connecticut	2	1	26	3					3	
New York	1,744	865	2,310	988					849	139
New Jersey	41	544	24	88				24	64	
Pennsylvania	806	732	330	659				98	560	1
Ohio	426	2	98	122					122	
Indiana	398	676		561			1	461	99	
Illinois	1,975	4,637	(3)	5,321			18	5,196	107	
Michigan	514	312	183	259				2	257	
Missouri	2	56		82				82		
Nebraska		1								
Kansas		2								
Delaware	30	540	31	481				432	49	
Maryland	291	495	83	147				98	49	
Virginia	324	623	19	445			2	416	27	
West Virginia	166	246	32	122				52	70	
North Carolina	3,242	1,250	2,172	2,564		27	841	1,696		
South Carolina	865	602	747	848		39	247	562		
Georgia	15,926	5,298	8,623	13,448	34	1,655	8,812	2,947		
Florida	8									
Kentucky	87	60		217			1	216		
Tennessee	2,077	1,144	256	1,364		1	17	1,346		
Alabama	325	81	42	232		35	140	57		
Mississippi	76	60	7	119	1	23	85	10		
Arkansas	4,010	2,679	41	4,203		65	1,823	2,315		
Louisiana		12	2	13			13			
Oklahoma	17	121		4				4		
Texas	278	569	21	143		16	123	4		
Idaho	125	135	1	31				14	17	
Colorado	1,117	1,765	1,369	1,503				660	834	9
New Mexico		3								
Utah	694	550	341	215				2	213	
Washington	1,741	1,554	609	912			5	613	291	3
Oregon	76	51	48	28				3	22	3
California	19,589	9,780	21,072	10,958	12	180	3,563	6,466	737	

TOTAL, ALL STATES

Year	May	June	July	Aug.	Sept.	Oct.	Total
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
1921	1,325	4,005	9,544	7,381	5,035	44	27,334
1922	695	3,189	7,598	11,928	13,779	1,216	38,405
1923	1	2,384	10,963	9,757	9,654	766	33,525
1924	28	1,873	14,603	13,781	7,889	[4] 1,323	39,497
1925	328	4,951	17,932	9,921	7,420	306	40,858
1926	52	2,209	21,793	24,538	8,847	[5] 1,026	58,465
1927	267	5,638	12,675	13,217	9,739	178	41,714
1928	12	1,755	23,122	22,819	8,802	462	56,972
1929	106	2,374	10,429	14,012	8,308	222	35,451
1930	18	2,515	12,956	15,526	7,333	142	38,490
1931 [2]	47	2,041	15,691	23,776	4,370	155	46,080

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis. Shipments by truck not included in this table. See 1927 Yearbook, p. 855, for data for earlier years.

[1] Crop movement season extends from May 1 through October of a given year.
[2] Preliminary.
[3] No shipments in 1930 because of frost killing.
[4] Includes 1 car in November.
[5] Includes 5 cars in November.

TABLE 225.—*Pears: Total production, foreign trade of the United States, and average price per bushel, 1913–1931*

Year	Production	Price per bushel received by producers [2]	Farm value	Domestic exports, year beginning July [1]			
				Fresh [3]	Canned [3]	Dried	Total in terms of fresh
	1,000 bushels	*Dollars*	*1,000 dollars*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 bushels*
1913	10,108						
1914	12,086						
1915	11,216						
1916	11,874						
1917	13,281						
1918	13,362	1.38	18,419				
1919	*14,204*						
1919	15,006	1.84	27,614				
1920	16,805	1.66	27,865				
1921	11,297	1.71	19,268				
1922	20,705	1.06	21,943	36,785	49,358		2,823
1923	17,845	1.21	21,570	50,237	38,431		2,648
1924	18,866	1.42	26,689	41,452	53,851		3,107
1925	20,720	1.40	29,066	71,205	75,876		4,645
1926	25,249	.89	22,399	73,877	66,104		4,293
1927	18,373	1.32	24,298	51,056	52,671		3,258
1928	24,212	1.02	24,663	82,847	82,652	[4] 2,626	5,388
1929	21,172	1.43	30,202	62,024	54,709	3,655	3,876
1930	[5] 25,540	.75	18,158	134,670	74,354	8,037	6,573
1931 [6]	[5] 23,009	.60	13,567				

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board: italic figures are census returns. Prices are based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

[1] Canned pears converted to terms of fresh on the basis that 1 pound canned fruit is equivalent to 2 pounds fresh; dried pears converted to terms of fresh on the basis that dried pears equal 25 per cent of fresh; 48 pounds fresh equals 1 bushel. No imports of pears reported.
[2] From 1918 to 1925, Nov. 15 price; 1926 to 1931, approximate average price for the season as reported Dec. 1.
[3] Exports were reported in value only, prior to July 1, 1922.
[4] January-June, 1929. Not previously reported.
[5] Includes some quantities not harvested on account of market conditions (1,292,000 bushels in 1930 and 458,000 in 1931). Prices and value are computed on harvested crop.
[6] Preliminary.

TABLE 226.—*Pears: Car-lot shipments, by State of origin, 1921–22 to 1930–31*

State	Crop-movement season [1]									
	1921–22	1922–23	1923–24	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31 [2]
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
New York	2,893	5,461	1,701	2,978	4,510	2,263	1,694	1,590	547	2,661
New Jersey	23	40	76	60	52	47	19	16	4	19
Ohio	17	96	33	47	62	100	130	104	33	77
Illinois	33	468	318	595	614	858	228	370	787	154
Michigan	653	1,860	543	394	151	457	536	449	147	469
Delaware		151	541	273	128	249	49	1	20	13
Maryland	3	36	63	30	29	33	32	27	42	9
Alabama	38	79	60	27	66	12	93	71	152	135
Texas	115	50	99	129	121	144	213	39	231	100
Colorado	745	774	696	955	717	750	737	264	1,082	249
Utah	33	82	65	81	29	77	34	49	47	38
Washington	2,903	2,678	4,274	2,456	3,560	5,278	2,589	5,868	4,035	6,157
Oregon	985	1,862	2,575	1,483	2,225	2,909	2,977	4,437	4,211	5,116
California	4,500	6,465	7,143	6,312	8,718	11,673	9,215	11,003	9,465	[3] 13,491
Other States	112	279	402	426	275	359	198	146	344	133
Total	13,053	20,381	18,589	16,246	21,257	25,209	18,744	24,434	21,147	28,821

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

[1] Crop movement season extends from June of one year through May of the following year.
[2] Preliminary.
[3] Includes 1 car in May, 1930, and 20 cars in June, 1931.

TABLE 227.—*Pears: Production and seasonal farm price, by States, 1925–1931*

State and division	Production							Seasonal farm price per bushel [1]						
	1925	1926	1927	1928	1929	1930	1931 [2]	1925	1926	1927	1928	1929	1930	1931
	1,000 bush.	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Maine	13	6	13	10	16	12	13	1.90	1.50	1.70	1.50	1.85	1.70	1.30
New Hampshire	19	10	14	9	13	13	12	1.58	1.65	1.70	1.70	1.60	1.50	1.40
Vermont	12	6	12	6	12	9	11	1.62	2.00	2.15	2.10	1.95	1.60	1.50
Massachusetts	90	60	81	56	59	74	46	1.65	1.80	1.75	1.70	1.80	1.20	1.30
Rhode Island	13	12	12	7	8	9	7	1.75	1.60	1.80	1.80	2.00	1.25	1.30
Connecticut	60	57	54	42	22	29	18	2.00	1.90	2.00	1.60	2.00	1.15	1.60
New York	3,045	2,088	1,872	1,800	715	1,935	805	1.55	1.25	1.50	1.45	1.85	.90	.90
New Jersey	512	645	420	502	73	104	96	1.70	.65	1.00	1.00	1.60	.90	.65
Pennsylvania	468	748	400	620	195	438	448	1.55	1.15	1.50	1.20	1.55	1.10	.65
North Atlantic	4,232	3,632	2,878	3,052	1,113	2,623	1,456	1.58	1.15	1.45	1.34	1.78	.96	.84
Ohio	354	430	250	395	204	220	510	1.25	.85	1.25	.90	1.40	1.15	.50
Indiana	209	328	140	288	185	111	244	1.00	.65	1.05	.75	.85	.90	.40
Illinois	540	818	312	540	600	265	765	1.20	.75	1.10	.85	.90	.95	.45
Michigan	450	889	702	819	346	602	450	1.15	.80	1.25	.95	1.35	1.05	.65
Wisconsin	15	-----	-----	-----	-----	-----	-----	1.50	-----	-----	-----	-----	-----	-----
Iowa	45	68	41	47	93	59	93	1.70	1.20	1.50	1.20	1.35	1.45	.90
Missouri	342	473	270	171	447	177	539	1.20	.80	1.15	1.15	.95	1.10	.55
Nebraska	18	29	36	12	53	36	35	2.00	1.60	1.60	1.90	1.50	1.55	1.00
Kansas	165	186	258	51	256	118	220	1.50	1.25	1.10	1.40	1.10	1.15	.65
North Central	2,138	3,221	2,009	2,323	2,184	1,588	2,856	1.22	.82	1.19	.93	1.08	1.08	.54
Delaware	180	388	128	108	33	20	39	1.00	.40	.60	.60	.50	.55	.40
Maryland	280	394	193	193	115	81	149	1.00	.55	.90	.90	.80	.85	.45
Virginia	135	410	130	230	402	100	510	1.30	.80	1.15	1.05	.90	1.35	.50
West Virginia	34	100	12	63	65	24	129	1.70	1.15	1.65	1.25	1.40	1.70	.70
North Carolina	158	270	100	234	205	115	323	1.70	1.15	1.35	1.10	1.20	1.30	.70
South Carolina	87	133	68	133	89	87	118	1.50	1.20	1.30	1.10	1.25	1.15	.75
Georgia	155	257	104	245	155	155	204	1.50	1.05	1.35	1.00	1.05	1.05	.70
Florida	54	66	44	52	45	49	59	1.25	1.25	1.15	.95	1.05	1.05	.70
South Atlantic	1,083	2,018	779	1,258	1,109	631	1,531	1.29	.81	1.07	1.00	1.02	1.14	.60
Kentucky	85	144	34	116	256	58	300	1.35	.95	1.45	1.10	1.00	1.35	.50
Tennessee	148	266	125	255	276	142	335	1.50	1.05	1.45	1.05	1.05	1.15	.55
Alabama	157	211	83	234	225	316	357	1.40	.90	1.30	1.10	1.15	1.00	.65
Mississippi	189	189	120	194	173	212	263	1.30	1.15	1.10	1.10	1.05	.95	.60
Arkansas	89	116	70	102	150	94	210	1.45	1.15	1.30	1.20	1.20	1.30	.55
Louisiana	74	71	50	69	64	62	82	1.45	1.30	1.40	1.35	1.35	1.30	.90
Oklahoma	146	81	130	72	311	66	95	1.60	1.40	1.30	1.30	1.05	1.20	.90
Texas	386	580	345	390	510	392	400	1.35	.90	1.25	1.25	1.00	1.10	.80
South Central	1,274	1,658	957	1,432	1,965	1,342	2,042	1.41	1.02	1.29	1.16	1.06	1.10	.65
Idaho	39	68	56	72	57	71	56	2.10	1.50	1.60	1.35	1.70	1.30	1.10
Colorado	510	564	480	185	600	146	385	1.15	.65	1.40	1.05	1.50	1.30	.60
New Mexico	56	42	28	27	58	28	53	1.70	1.50	1.70	1.55	1.40	1.45	.80
Arizona	14	15	12	15	15	14	15	2.20	2.50	2.50	2.50	2.45	2.10	1.35
Utah	25	80	60	87	79	95	49	1.75	1.10	1.70	1.40	1.50	1.25	1.20
Nevada	7	6	2	6	3	5	4	2.00	2.00	2.50	2.50	2.55	2.20	2.00
Washington	2,300	3,220	1,670	3,700	3,322	4,463	3,650	1.70	.80	1.35	1.05	1.35	.75	.50
Oregon	1,500	2,100	1,900	2,700	2,750	3,200	1,995	1.60	.85	1.40	1.00	1.40	.75	.70
California	7,542	8,625	7,542	9,355	7,917	[3] 11,334	[3] 8,917	1.25	.84	1.30	.90	1.65	.55	.58
Western	11,993	14,720	11,750	16,147	14,801	19,356	15,124	1.38	.83	1.33	.96	1.53	.65	.58
United States	20,720	25,249	18,373	24,212	21,172	[3] 25,540	[3] 23,009	1.40	.89	1.32	1.02	1.43	.75	.60

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board. Prices are based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 census. Earlier years not so revised.

[1] In 1925, Nov. 15 price; 1926–1931, approximate average price for the season as reported Dec. 1.
[2] Preliminary.
[3] Includes some quantities not harvested on account of market conditions (1,292,000 bushels in 1930 and 458,000 in 1931.) Prices and value computed on harvested crop.

TABLE 228.—*Peas, green, commercial crop: Acreage, production, and price per bushel or per 1,000 pounds 1928–1931*

Utilization and State	Acreage				Production				Seasonal farm price			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	Acres	*Acres*	*Acres*	*Acres*	*1,000 bush.*[1]	*1,000 bush.*[1]	*1,000 bush.*[1]	*1,000 bush.*[1]	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
For market	60,300	68,020	83,980	86,550	5,095	5,681	7,006	6,317	1.71	1.69	1.42	1.42
					1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
For manufacture [2]												
Maine	1,100	1,150	1,330	1,470	1,980	1,840	2,992	2,102	3.5	3.5	3.5	2.8
New York	32,200	32,800	34,440	31,900	48,815	39,360	75,768	41,151	3.0	3.0	3.1	2.7
New Jersey	350	400	600	500	770	800	300	715	4.0	3.5	3.5	3.0
Pennsylvania	1,680	1,730	2,010	1,920	3,063	4,325	1,809	2,918	3.0	3.0	3.0	2.7
Ohio	4,020	5,030	5,410	5,800	6,030	7,545	4,598	8,932	2.7	2.4	2.2	2.1
Indiana	5,290	5,500	6,270	5,950	9,797	9,350	13,857	15,827	2.0	2.6	2.6	2.5
Illinois	8,740	11,010	12,660	13,100	15,356	18,056	27,852	21,877	2.0	2.5	3.0	2.9
Michigan	8,500	10,900	11,660	10,200	13,294	13,625	22,037	10,812	2.0	2.4	2.6	2.5
Wisconsin	101,000	111,000	127,000	98,000	203,616	205,350	229,870	107,800	3.0	3.0	2.9	2.7
Minnesota	7,920	12,670	17,900	16,500	16,347	21,184	30,967	15,520	2.0	2.7	2.7	2.7
Delaware	2,060	3,040	3,200	2,620	3,529	6,536	1,056	4,795	3.0	3.0	3.0	3.0
Maryland	10,500	12,400	13,000	13,860	20,475	27,900	6,500	22,730	3.0	3.0	3.0	2.8
Montana	3,500	3,900	3,500	2,400	7,560	7,254	8,190	6,000	2.5	2.5	2.3	2.0
Colorado	3,000	3,400	3,700	3,500	5,700	6,038	6,734	5,180	2.5	2.2	2.3	2.3
Utah	10,150	11,670	13,070	7,200	26,035	26,316	35,942	14,688	3.0	2.8	2.8	2.7
Washington [3]	-------	1,940	2,100	2,000	-------	4,268	5,250	2,400	------	3.0	3.0	2.5
California	1,100	880	950	1,000	2,420	799	2,508	2,200	2.8	3.0	3.0	3.0
Other States [4]	4,850	3,500	5,100	4,590	8,594	6,510	7,737	8,870	3.0	3.0	3.0	2.9
Total for manufacture	205,960	232,920	263,900	222,510	393,381	407,056	483,967	293,517	2.8	2.9	2.9	2.7

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and canning establishments.

[1] Bushels containing approximately 32 pounds, unshelled.
[2] Reported on shelled basis.
[3] Included in other States prior to 1929.
[4] Other States include Idaho, Iowa, Kansas, Tennessee, Virginia, and Wyoming.

TABLE 229.—*Peas, green: Car-lot shipments by State of origin, 1925–1931*

State	Crop movement season [1]						
	1925	1926	1927	1928	1929	1930	1931 [2]
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
New York	885	1,110	975	837	731	892	431
New Jersey	20	27	40	38	28	1	13
Maryland	48	55	54	68	52	2	14
Virginia	303	288	259	281	222	129	232
North Carolina	491	596	570	685	368	482	554
South Carolina	104	167	207	247	244	265	249
Mississippi	149	233	243	250	199	234	285
Idaho	13	40	101	176	238	407	415
Colorado	35	58	149	348	459	463	556
Washington	43	64	111	152	334	791	539
California [3]	223	859	1,328	1,529	2,177	3,000	3,628
Other States [3]	42	125	109	77	108	134	251
Total	2,356	3,622	4,146	4,688	5,160	6,800	7,167

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

[1] Crop movement season is for calendar year except for Imperial Valley, California; Florida; and Texas which begins in October of the preceding year.
[2] Preliminary.
[3] Figures for certain States include shipments in preceding year as follows: California, 1926, 4 cars in October, 220 in November, and 94 in December; 1927, 1 car in October, 223 in November, and 38 in December; 1928, 202 cars in November and 92 in December; 1929, 259 cars in November and 148 in December, 1930, 4 cars in October, 188 in November, and 243 in December; 1931, 22 cars in October, 737 in November; and 170 in December. Florida, 1927, 2 cars in December; 1928, 5 cars in November and 4 in December; 1929, 1 car in December; 1931, 1 car in December. Texas, 1927, 1 car in December; 1928, 1 car in November.

TABLE 230.—*Peas, canned: Pack* [1] *in the United States, 1918–1931*

State	Season													
	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
	1,000 cases	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*
New York	2, 000	1, 040	2, 381	1, 382	2, 137	2, 541	2, 931	2, 385	2, 624	1, 668	2, 222	1, 683	3, 164	1, 786
New Jersey [2]	332	248	549	345	153	199	331	257	143	267	242	383	74	298
Ohio	442	306	282	241	225	384	430	232	278	205	336	337	208	398
Indiana	454	381	271	182	268	367	483	86	500	90	427	404	564	711
Illinois	978	433	460	331	516	586	697	357	680	563	617	767	1, 560	1, 003
Michigan	477	425	549	317	455	392	710	451	723	399	542	558	880	434
Wisconsin	4, 520	4, 317	5, 804	4, 063	7, 042	6, 961	10, 390	10, 003	9, 287	6, 549	9, 248	9, 399	10, 492	5, 057
Minnesota [3]	------	------	------	------	------	254	470	432	446	497	722	926	1, 333	617
Maryland	683	509	696	533	489	591	873	956	840	986	1, 030	1, 469	400	1, 243
Utah	527	395	595	376	751	918	830	1, 346	1, 029	802	1, 154	1, 241	1, 662	676
California	253	205	328	84	496	239	282	271	222	(4)	(4)	(4)	(4)	(4)
Other States	397	426	402	353	510	516	888	1, 040	937	910	1, 403	1, 363	1, 698	1, 063
U. S.	11, 063	8, 685	12, 317	8, 207	13, 042	13, 948	19, 315	17, 816	17, 709	12, 936	17, 943	18, 530	22, 035	13, 286

Bureau of Agricultural Economics. Compiled from National Canners' Association, 1918–1926; Bureau of Census, 1927–1929; beginning 1930, Foodstuffs Division, Bureau of Foreign and Domestic Commerce.

[1] Stated in cases of 24 No. 2 cans.
[2] Includes Delaware.
[3] Previous to 1923, included in "Other States."
[4] Included in "Other States."

TABLE 231.—*Pecan trees: Number in specified States, by age groups, 1929* [1]

State	Improved varieties [2]					
	Planted in 1929	1 to 4 years	5 to 9 years	10 to 14 years	15 to 19 years	20 to 24 years
North Carolina	22, 300	131, 100	47, 400	33, 500	30, 700	7, 300
South Carolina	10, 000	157, 000	64, 000	44, 000	30, 000	13, 000
Georgia	109, 000	1, 014, 000	919, 000	697, 000	482, 000	130, 000
Florida	12, 000	156, 000	175, 000	119, 000	60, 000	75, 000
Alabama	49, 000	250, 000	232, 000	143, 000	188, 000	18, 000
Arkansas	30, 400	143, 800	31, 700	20, 800	14, 500	3, 500
Mississippi	23, 400	205, 700	142, 300	131, 300	80, 000	24, 300
Louisiana	9, 280	87, 350	46, 307	33, 743	56, 518	32, 899
Oklahoma	100, 000	365, 000	30, 000	5, 000	------	------
Texas	63, 400	386, 000	67, 300	28, 400	101, 000	10, 000
Total, 11 States	428, 780	2, 895, 950	1, 755, 007	1, 255, 743	1, 042, 718	313, 999

State	Improved varieties [2]			Seedlings [3]		
	25 to 29 years	30 years and over	Total	Nonbearing age	Bearing age	Total
Missouri	------	------	------	178, 000	267, 000	445, 000
North Carolina	6, 100	600	279, 000	10, 000	31, 000	41, 000
South Carolina	10, 000	7, 000	335, 000	2, 000	23, 000	25, 000
Georgia	51, 000	13, 000	3, 415, 000	20, 000	70, 000	90, 000
Florida	25, 000	3, 000	625, 000	15, 000	50, 000	65, 000
Alabama	9, 000	4, 000	893, 000	5, 000	42, 000	47, 000
Arkansas	3, 400	2, 900	251, 000	150, 000	400, 000	550, 000
Mississippi	11, 100	15, 600	633, 700	117, 800	241, 000	358, 800
Louisiana	8, 717	6, 186	281, 000	177, 000	354, 000	531, 000
Oklahoma	------	------	500, 000	600, 000	1, 800, 000	2, 400, 000
Texas	900	3, 000	660, 000	1, 540, 000	4, 460, 000	6, 000, 000
Total, 11 States	125, 217	55, 286	7, 872, 700	2, 814, 800	7, 738, 000	10, 552, 800

Bureau of Agricultural Economics.

[1] Estimate based upon age distribution shown by 1929 survey supplemented by number of trees of bearing age and nonbearing age reported by the census of 1925.
[2] Improved trees are those that have been grafted, budded, or top worked with scions or buds of improved varieties.
[3] Seedling trees are those grown from the seed, including native wild trees.

TABLE 232.—*Pecans: Estimated production and December 1 price, by States, 1927–1931*

State	Production														
	Improved varieties					Seedling varieties					Total				
	1927	1928	1929	1930	1931 [1]	1927	1928	1929	1930	1931 [1]	1927	1928	1929	1930	1931 [1]
	1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
Ill	0	0	0	0	0	90	18	150	200	250	90	18	150	200	250
Mo	5	8	18	12	40	488	386	882	588	1, 960	493	394	900	600	2, 000
N. C	427	390	412	384	735	284	240	252	216	315	711	630	664	600	1, 050
S. C	902	900	476	767	785	255	200	104	157	150	1, 157	1, 100	580	924	935
Ga	2, 927	6, 760	3, 560	3, 960	7, 820	476	840	440	440	680	3, 403	7, 600	4, 000	4, 400	8, 500
Fla	801	1, 500	648	770	1, 760	343	500	216	230	440	1, 144	2, 000	864	1, 000	2, 200
Ala	1, 255	2, 500	1, 345	2, 320	3, 080	354	500	275	410	420	1, 609	3, 000	1, 620	2, 730	3, 500
Miss	1, 120	3, 300	1, 196	2, 816	2, 700	2, 080	3, 000	1, 104	2, 399	2, 300	3, 200	6, 300	2, 300	5, 215	5, 000
Ark	60	95	45	84	168	1, 440	1, 600	705	1, 316	2, 632	1, 500	1, 695	750	1, 400	2, 800
La	398	750	375	880	840	2, 253	4, 250	2, 125	4, 620	4, 410	2, 651	5, 000	2, 500	5, 500	5, 250
Okla	23	20	74	84	115	4, 663	4, 420	14, 826	11, 916	11, 385	4, 686	4, 440	14, 900	12, 000	11, 500
Tex	192	765	665	357	960	9, 408	26, 683	21, 495	11, 543	31, 040	9, 600	27, 448	22, 160	11, 900	32, 000
U. S	8, 110	16, 988	8, 814	12, 434	19, 003	22, 134	42, 637	42, 574	34, 035	55, 982	30, 244	59, 625	51, 388	46, 469	74, 985

ESTIMATED PRICE PER POUND DECEMBER 1

State	Improved 1927	Improved 1928	Improved 1929	Improved 1930	Improved 1931	Seedling 1927	Seedling 1928	Seedling 1929	Seedling 1930	Seedling 1931	Total 1927	Total 1928	Total 1929	Total 1930	Total 1931
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Ill	-----	-----	-----	-----	-----	14. 0	15. 0	15. 0	14. 0	8. 0	14. 0	15. 0	15. 0	14. 0	8. 0
Mo	48. 0	35. 0	30. 0	20. 0	15. 0	20. 0	16. 0	13. 0	12. 0	8. 0	20. 3	16. 5	13. 3	12. 2	8. 2
N. C	40. 0	36. 0	34. 0	33. 0	20. 0	27. 0	22. 0	20. 0	18. 0	14. 0	34. 9	30. 6	28. 6	27. 7	18. 2
S. C	35. 0	33. 0	35. 0	28. 0	17. 0	23. 0	17. 0	20. 0	18. 0	11. 0	32. 4	30. 1	32. 4	26. 3	15. 9
Ga	34. 0	28. 0	31. 0	30. 0	12. 0	17. 0	13. 0	15. 0	14. 0	6. 0	31. 6	26. 3	29. 2	28. 4	11. 5
Fla	33. 0	31. 0	33. 0	29. 0	14. 0	17. 0	16. 0	17. 0	17. 0	8. 0	28. 1	27. 2	29. 1	26. 2	12. 8
Ala	37. 0	30. 0	30. 0	25. 0	14. 0	20. 0	13. 0	16. 0	12. 0	8. 0	33. 3	27. 2	27. 7	23. 0	13. 3
Miss	38. 0	30. 0	32. 0	27. 0	14. 0	19. 0	14. 0	17. 0	12. 0	7. 0	25. 7	22. 4	24. 8	20. 1	10. 8
Ark	35. 0	32. 0	35. 0	30. 0	15. 0	15. 0	14. 0	12. 0	12. 0	6. 0	15. 8	15. 0	13. 5	13. 1	6. 5
La	38. 0	27. 0	31. 0	24. 0	16. 0	16. 0	10. 7	15. 0	12. 0	7. 5	19. 3	13. 1	17. 4	13. 9	8. 9
Okla	35. 0	35. 0	39. 0	30. 5	19. 0	13. 0	11. 0	10. 2	9. 1	5. 0	13. 1	11. 1	10. 3	9. 2	5. 1
Tex	35. 0	35. 0	32. 0	27. 0	17. 0	16. 0	11. 7	11. 0	11. 0	5. 3	16. 4	12. 4	11. 6	11. 5	5. 6
U. S	35. 6	29. 7	31. 7	27. 8	13. 8	16. 0	12. 0	11. 3	10. 8	5. 7	21. 2	17. 0	14. 8	15. 3	7. 8

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

1 Preliminary.

TABLE 233.—*Plums and prunes: Production and seasonal farm price, by States, 1926–1931*

Crop and State	Production						Seasonal farm price					
	1926	1927	1928	1929	1930	1931 [1]	1926	1927	1928	1929	1930	1931
Plums and fresh prunes:	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
California	71, 000	57, 000	66, 000	40, 000	82, 000	[3] 65, 000	25. 00	45. 00	37. 00	90. 00	35. 00	24. 00
Oregon	17, 500	18, 100	25, 300	28, 500	25, 000	21, 500	25. 00	20. 00	25. 00	24. 50	20. 00	20. 00
Washington	11, 300	9, 300	19, 500	23, 750	18, 875	11, 750	27. 00	25. 00	28. 00	22. 50	22. 00	20. 00
Idaho	19, 600	21, 600	21, 700	25, 000	22, 000	19, 500	30. 00	27. 00	30. 00	22. 00	24. 00	21. 00
Total	119, 400	106, 000	132, 500	117, 250	147, 875	117, 750	26. 01	35. 31	32. 24	45. 90	29. 17	22. 29
Prunes, dried:												
California	150, 000	225, 000	220, 300	103, 000	[3] 267,000	173, 000	100, 00	70. 00	100. 00	155. 00	55. 00	58. 00
Oregon	34, 000	16, 000	5, 000	50, 000	[3] 25, 500	27, 000	95. 00	90. 00	160. 00	140. 00	70. 00	75. 00
Washington	6, 250	3, 500	900	7, 500	3, 750	3, 750	95. 00	95. 00	160. 00	140. 00	70. 00	75. 00
Idaho	-------	-------	84	880	215	-------	------	-----	150. 00	130. 00	65. 00	-----
Total	190, 250	244, 500	226, 284	161, 380	[3] 296,465	[3] 203,750	98. 94	71. 67	101. 58	149. 52	56. 16	60. 56

Bureau of Agricultural Economics.

1 Preliminary.
2 Seasonal average to Dec. 1.
3 Includes some fruit not harvested on account of market conditions (but not included in computing value) as follows: Plums and fresh prunes, California, 1931, 6,000 tons; prunes, dried, California, 1930, 13,000 tons, Oregon, 1930, 8,000 tons.

TABLE 234.—*Potatoes: Acreage, production, value, exports, etc., United States, 1909–1931*

Year	Acreage	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value Dec. 1	Wholesale price per bushel at New York [1]	Domestic exports, year beginning July [2]	Imports year beginning July [2]	Net balance, year beginning July [2] [3]
	1,000 acres	*Bushels*	*1,000 bushels*	*Cents*	*1,000 dollars*	*Cents*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1909	*3,669*	*106.1*	*389,195*						
1909	3,669	107.5	394,552	54.2	213,679	49	999	353	+646
1910	3,720	93.8	349,032	55.7	194,566	54	2,384	219	+2,177
1911	3,619	80.9	292,737	79.9	233,778	106	1,237	13,735	−12,283
1912	3,711	113.4	420,647	50.5	212,550	62	2,028	337	+1,693
1913	3,668	90.4	331,525	68.7	227,903	78	1,794	3,646	−1,823
1914	3,711	110.5	409,921	48.7	199,460	47	3,135	271	+2,866
1915	3,734	96.3	359,721	61.7	221,992	103	4,018	210	+3,810
1916	3,565	80.5	286,953	146.1	419,333	238	2,489	3,079	−558
1917	4,384	100.8	442,108	122.8	542,774	129	3,453	1,180	+2,273
1918	4,295	95.9	411,860	119.3	491,527	127	3,689	3,534	+205
1919	*3,252*	*89.3*	*290,428*						
1919	3,295	90.7	298,975	158.0	472,289	284	3,723	6,941	−3,212
1920	3,302	112.5	371,356	112.8	418,926	103	4,803	3,423	+1,399
1921	3,598	91.0	327,365	108.1	353,803	123	2,327	2,110	+222
1922	3,943	106.4	419,655	55.7	233,909	97	2,980	572	+2,408
1923	3,384	108.6	367,534	75.7	278,251	118	3,075	564	+2,512
1924	*2,911*	*121.1*	*352,462*						
1924	3,111	124.1	386,219	62.3	240,757	78	3,653	478	+3,187
1925	2,825	105.9	299,072	187.2	559,939	238	1,824	5,420	−3,575
1926	2,817	114.7	323,085	[4] 141.3	456,601	161	2,092	6,349	−4,205
1927	3,177	116.6	370,423	[4] 95.1	352,375	129	2,424	3,803	−1,313
1928	3,474	122.8	426,776	[4] 52.7	224,859	76	3,165	2,698	+528
1929	2,978	110.5	329,134	[4] 128.8	423,896	163	2,386	6,006	−3,521
1930	3,038	109.7	333,210	[4] 89.0	296,505	111	1,548	5,729	−4,155
1931 [5]	3,382	111.3	376,248	[4] 42.9	161,264				

Bureau of Agricultural Economics. Acreage, yield, and production figures are estimates of the crop reporting board, revised, 1919 to 1928. See introductory text; italic figures are census returns. Prices received by producers are based upon returns from crop reporters. See 1927 Yearbook, p. 881, for data for earlier years.

[1] Compiled from Producers Price Current. Prices 1909–1919 are averages of the high and low weekly quotations of New York potatoes, October–June, converted from dollars per 180 pounds to cents per bushel; beginning 1920, season September–May.

[2] Compiled from Commerce and Navigation of the United States, 1909–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1926, January and June issues, 1927–1930 and official records of the Bureau of Foreign and Domestic Commerce.

[3] The difference between total exports (domestic exports plus reexports) and total imports; + indicates net exports and − indicates net imports.

[4] For some of the early and midseason States prices represent approximate seasonal average.

[5] Preliminary.

TABLE 235.—*Potatoes: Car-lot shipments, United States, by months, 1921–1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
1921	14,477	12,487	16,449	14,948	14,926	16,421	15,606	16,240	26,322	42,956	16,729	10,440	218,001
1922	16,721	13,722	22,334	20,059	20,284	22,104	18,833	18,239	24,420	35,193	21,050	12,448	245,407
1923	17,262	14,609	24,468	23,199	16,302	20,295	16,733	16,735	24,063	35,223	20,737	11,977	241,603
1924	19,762	20,716	22,940	19,461	18,736	20,845	23,626	16,394	21,387	34,141	20,852	13,237	252,097
1925	21,715	20,394	21,639	20,123	20,215	19,798	17,765	14,864	23,569	33,631	16,286	11,524	241,523
1926	16,185	14,834	19,974	14,238	16,903	23,587	20,310	15,327	22,978	36,182	18,419	13,487	232,424
1927	17,974	17,784	21,497	20,283	16,691	22,155	21,053	17,853	25,003	38,333	21,124	13,695	253,445
1928	20,278	22,913	23,710	17,255	23,740	29,675	21,048	16,252	21,127	29,906	18,232	13,207	257,343
1929	20,096	20,472	23,059	20,153	20,360	24,813	19,583	17,395	24,441	31,958	15,706	15,158	253,194
1930	20,302	19,918	22,108	19,769	22,803	25,004	22,326	16,775	22,415	29,076	16,502	15,413	252,411
1931 [1]	21,241	20,312	23,885	21,461	24,072	27,264	20,379	11,977	17,457	24,410	14,346	13,109	239,913

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis, 400 to 700 bushels to a carload.

[1] Preliminary.

TABLE 236.—*Potatoes: Acreage and production, by States, average 1924–1928, annual 1928–1931*

State and division	Acreage					Production				
	Average 1924–1928	1928	1929	1930	1931[1]	Average 1924–1928	1928	1929	1930	1931[1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*
Maine	148	179	171	181	196	37,684	39,380	49,932	45,250	50,960
New Hampshire	10	10	8	9	9	1,278	1,100	1,160	1,665	1,485
Vermont	19	17	15	15	17	2,254	2,040	1,875	2,475	2,550
Massachusetts	14	14	11	11	13	1,501	1,260	1,155	1,870	1,625
Rhode Island	2	2	2	2	2	244	220	254	380	300
Connecticut	14	12	11	11	12	1,554	1,380	1,287	1,925	1,920
New York	245	232	213	198	202	28,363	27,608	21,513	23,364	28,684
New Jersey	53	47	38	37	41	7,475	7,755	4,902	7,511	7,831
Pennsylvania	200	210	195	189	191	22,872	26,670	20,865	17,955	26,549
North Atlantic	704	723	664	653	683	103,224	107,413	102,943	102,395	121,904
Ohio	108	119	105	105	110	10,285	11,424	10,080	9,240	11,220
Indiana	49	55	50	51	58	4,536	5,775	4,200	4,539	4,930
Illinois	53	53	47	50	55	4,765	5,830	3,948	3,900	4,675
Michigan	243	271	225	227	250	26,510	31,436	15,975	14,301	23,750
Wisconsin	240	273	215	239	268	26,308	30,576	20,640	18,164	24,924
Minnesota	321	379	330	314	361	33,855	41,311	25,740	22,608	28,880
Iowa	78	81	77	70	81	7,588	10,368	7,700	4,900	4,455
Missouri	54	59	50	48	49	4,776	7,139	3,950	4,848	3,675
North Dakota	96	123	121	97	114	8,422	12,177	6,776	6,305	8,436
South Dakota	52	60	56	58	54	4,594	5,760	4,200	3,654	2,160
Nebraska	95	119	101	101	131	7,969	10,829	9,393	9,595	6,812
Kansas	48	50	44	42	46	4,931	7,500	3,960	4,788	3,634
North Central	1,436	1,642	1,421	1,402	1,577	144,538	180,125	116,562	106,842	127,551
Delaware	5	5	4	4	5	471	470	344	200	540
Maryland	35	36	30	30	32	3,664	4,320	3,390	2,520	3,360
Virginia	115	121	103	117	118	15,357	18,876	15,244	13,689	14,160
West Virginia	36	38	36	38	40	3,540	4,560	3,780	2,394	3,200
North Carolina	61	83	62	76	79	6,136	9,379	6,138	7,220	8,532
South Carolina	26	29	20	21	25	3,019	3,451	2,600	2,835	3,550
Georgia	12	14	13	15	18	761	924	884	1,065	1,224
Florida	27	32	23	32	28	3,056	4,000	2,714	2,560	3,640
South Atlantic	318	358	291	333	345	36,004	45,980	35,094	32,483	38,206
Kentucky	48	56	49	44	55	4,442	6,440	4,655	2,772	3,960
Tennessee	38	43	39	41	57	2,897	3,784	3,159	2,419	3,021
Alabama	26	31	22	28	39	1,925	2,356	1,694	2,184	3,666
Mississippi	9	10	9	9	14	603	790	702	594	1,134
Arkansas	30	36	29	31	43	2,053	2,844	2,494	2,697	3,784
Louisiana	32	38	29	34	48	1,900	2,546	1,653	2,346	3,936
Oklahoma	39	52	39	38	45	2,875	3,744	2,925	3,496	3,240
Texas	36	48	42	57	67	2,379	3,072	2,982	4,788	4,891
South Central	257	314	258	282	368	19,074	25,576	20,264	21,296	27,632
Montana	22	23	21	18	19	2,343	2,645	1,869	1,764	1,805
Idaho	84	104	82	98	110	16,503	19,136	15,416	24,500	24,200
Wyoming	15	22	20	23	32	1,686	2,310	1,840	3,450	3,360
Colorado	85	114	90	92	101	13,511	17,670	14,670	17,480	9,595
New Mexico	3	4	4	5	5	190	280	320	350	385
Arizona	3	3	2	3	3	219	222	170	255	255
Utah	13	14	11	12	15	1,832	2,016	2,035	2,160	1,950
Nevada	5	5	4	3	3	684	700	560	510	300
Washington	53	54	44	48	44	9,144	9,180	7,260	7,680	6,820
Oregon	37	41	33	33	42	4,108	5,043	3,366	5,115	5,460
California	46	53	33	33	35	8,056	8,480	6,765	6,930	6,825
Western	366	437	344	368	409	58,275	67,682	54,271	70,194	60,955
United States	3,081	3,474	2,978	3,038	3,382	361,115	426,776	329,134	333,210	376,248

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

[1] Preliminary.

TABLE 237.—*Potatoes: Yield per acre and estimated price per bushel December 1, by States, averages, and annual 1926–1931*

State and division	Yield per acre							Estimated price per bushel [1]						
	Av., 1919–1928	1926	1927	1928	1929	1930	1931	Av., 1925–1929	1926	1927	1928	1929	1930	1931
	Bush.	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Maine	248	285	230	220	292	250	260	116	133	85	40	120	65	20
New Hampshire	120	130	125	110	145	185	165	157	170	140	80	160	105	60
Vermont	120	125	125	120	125	165	150	143	140	125	85	150	90	50
Massachusetts	110	125	85	90	105	170	125	170	180	155	90	180	110	65
Rhode Island	116	150	100	110	127	190	150	170	180	155	90	180	115	65
Connecticut	111	130	90	115	117	175	160	173	180	165	90	180	115	65
New York	114	120	112	119	101	118	142	142	160	125	65	145	90	40
New Jersey [1]	136	145	161	165	129	203	191	141	155	110	50	160	95	60
Pennsylvania	106	107	110	127	107	95	139	142	170	120	65	160	115	45
North Atlantic	138.1	151.7	141.8	148.6	155.0	156.8	178.5	132.3	152.0	108.7	56.0	137.8	84.9	35.3
Ohio	88	92	101	96	96	88	102	144	170	120	75	155	110	55
Indiana	81	85	95	105	84	89	85	142	165	110	70	150	115	55
Illinois	76	80	84	110	84	78	85	149	175	115	65	155	125	65
Michigan	104	121	84	116	71	63	95	107	120	90	40	125	85	30
Wisconsin	104	114	92	112	96	76	93	106	120	85	35	120	80	30
Minnesota	96	98	99	109	78	72	80	92	115	60	30	100	65	30
Iowa	87	79	82	128	100	70	55	139	170	100	51	140	130	60
Missouri	80	80	83	121	79	101	75	144	170	115	60	150	100	70
North Dakota	82	77	97	99	56	65	74	91	120	50	30	105	80	30
South Dakota	81	68	115	96	75	63	40	110	159	55	40	115	95	45
Nebraska	80	70	101	91	93	95	52	115	160	75	50	110	85	50
Kansas	88	91	110	150	90	114	79	138	170	100	45	140	90	60
North Central	92.6	97.0	94.2	109.7	82.0	76.2	80.9	111.6	134.0	81.9	42.4	122.7	87.8	38.8
Delaware	87	86	119	94	86	50	108	131	140	80	75	160	115	55
Maryland [1]	103	94	133	120	113	84	105	122	140	105	50	125	95	55
Virginia [1]	121	105	161	156	148	117	120	128	140	130	50	120	100	55
West Virginia	97	100	105	120	105	63	80	141	167	125	80	125	130	80
North Carolina [1]	94	93	97	113	99	95	108	135	160	150	65	105	120	60
South Carolina [1]	115	126	99	119	130	135	142	155	170	190	65	135	130	70
Georgia [1]	65	64	70	66	68	71	68	164	190	165	115	140	135	95
Florida [1]	105	118	105	125	118	80	130	215	300	185	150	180	185	110
South Atlantic	106.8	101.9	123.9	128.4	120.6	97.5	110.7	139.5	165.7	138.3	67.4	125.0	116.8	66.1
Kentucky [1]	83	89	90	115	95	63	72	140	155	130	80	130	125	75
Tennessee [1]	73	77	85	88	81	59	53	142	157	135	90	120	125	85
Alabama [1]	74	72	73	76	77	78	94	158	190	150	85	145	145	70
Mississippi [1]	71	66	72	79	78	66	81	164	180	165	120	155	140	75
Arkansas [1]	69	59	68	79	86	87	88	153	185	150	80	125	115	55
Louisiana [1]	59	57	53	67	57	69	82	162	190	165	100	145	135	50
Oklahoma [1]	71	73	73	72	75	92	72	156	170	180	75	120	110	60
Texas [1]	63	73	65	64	71	84	73	171	200	165	100	150	150	80
South Central	71.1	72.4	73.3	81.5	78.5	75.5	75.1	151.6	174.6	151.4	86.8	132.7	130.5	68.3
Montana	107	85	140	115	89	98	95	114	120	65	55	170	110	60
Idaho	187	185	230	184	188	250	220	94	105	55	45	120	60	30
Wyoming	103	110	130	105	92	150	105	110	125	70	65	130	75	45
Colorado	145	145	165	155	163	190	95	99	130	55	45	110	60	30
New Mexico	56	70	75	70	80	70	77	148	175	120	95	150	115	70
Arizona	74	55	80	74	85	85	85	164	200	110	110	170	125	120
Utah	150	145	135	144	185	180	130	92	105	75	45	100	60	40
Nevada	145	140	136	140	140	170	100	128	130	85	85	150	110	60
Washington	161	180	195	170	165	160	155	103	95	60	50	145	75	40
Oregon	108	106	120	123	102	155	130	107	100	75	70	140	85	50
California [1]	161	175	175	160	205	210	195	126	132	95	65	135	110	72
Western	148.5	152.5	176.6	154.9	157.8	190.7	149.0	103.3	113.8	63.9	52.0	125.7	71.3	40.4
United States	109.3	114.7	116.6	122.8	110.5	109.7	111.3	121.0	141.3	95.1	52.7	128.8	89.0	42.9

Bureau of Agricultural Economics. Yield figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text. Prices are based upon returns from crop reporters.

[1] Prices shown for years 1926–1931 in early and mid-season States marked represent approximate seasonal average.

TABLE 238.—*Potatoes: Acreage, yield per acre, and production in specified countries, average 1925–26 to 1929–30, annual 1930–31 and 1931–32*

Country	Acreage			Yield per acre			Production		
	Average 1925–26 to 1929–30	1930–31	1931–32 [1]	Average 1925–26 to 1929–30	1930–31	1931–32 [1]	Average 1925–26 to 1929–30	1930–31	1931–32 [1]
NORTHERN HEMISPHERE	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Bushels*	*Bushels*	*Bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
North America:									
Canada	552	571	584	135.1	140.8	149.3	74,579	80,402	87,175
United States	3,297	3,038	3,382	113.6	109.7	111.3	374,520	333,210	376,248
Total	3,849	3,609	3,966	116.7	114.6	116.8	449,099	413,612	463,423
Europe:									
United Kingdom	800	684	709	248.1	243.4		198,501	166,486	
Irish Free State	369	347	346	238.1	251.5		87,856	87,265	
Norway	120	117	116	263.3	240.5	261.6	31,592	28,144	30,344
Sweden	366	336	327	173.2	196.8	157.3	63,397	66,112	51,440
Denmark	173	167	156	209.5	216.6	212.0	36,243	36,170	33,069
Netherlands	433	397	401	280.0	281.3	235.7	121,249	111,691	94,496
Belgium	408	402	402	305.4	270.8	252.7	124,585	108,848	101,580
France	3,608	3,499	3,516	145.4	141.0	168.4	524,505	493,426	592,194
Spain	[2] 812	915		[2] 172.0	168.8		[2] 139,671	154,438	124,162
Italy	868	863	874	83.9	83.2	63.2	72,837	71,794	55,262
Switzerland	116	120	113	224.7	180.7	249.2	26,069	21,679	28,164
Germany	6,945	6,930	6,979	201.7	249.7	230.9	1,400,991	1,730,596	1,611,797
Austria	453	466	479	183.7	209.2	181.3	83,216	97,483	86,865
Czechoslovakia	1,738	1,639	1,779	178.4	200.7	177.7	310,025	328,869	316,062
Hungary	652	673	710	110.8	100.5	76.2	72,221	67,661	54,074
Yugoslavia	560	599		74.4	90.2		41,649	54,031	
Rumania	644	632	683	117.8	113.8	127.8	75,865	71,941	[3] 87,302
Poland	6,125	6,602	6,715	158.7	172.0	179.9	972,152	1,135,455	1,208,113
Lithuania	347	403	409	155.1	172.2	188.7	53,810	69,404	77,161
Latvia	200	231	247	142.4	175.6	163.6	28,477	40,568	40,410
Estonia	166	168	167	158.1	188.8	173.6	26,245	31,714	28,999
Finland	171	175	174	160.9	164.9	153.0	27,521	28,857	26,621
Russia	13,476	14,378	14,838	119.0	131.0		1,604,067	1,883,096	
Total European countries reporting area and production all years	23,533	23,820	24,247	172.1	190.6	186.6	4,051,000	4,540,412	4,523,953
Estimated European total, excluding Russia	26,200	26,500	27,000				4,533,000	5,035,000	4,967,000
Total Northern Hemisphere countries reporting area and production all years	27,382	27,429	28,213	164.3	180.6	176.8	4,500,099	4,954,024	4,987,376
Estimated Northern Hemisphere total, excluding Russia and China	30,900	31,100	31,800				5,056,000	5,521,000	5,550,000
SOUTHERN HEMISPHERE									
Chile	93	111	101	145.8	148.1		13,557	16,435	
Argentina	297			97.7			29,031		
Australia	140			95.1			13,315		
Estimated Southern Hemisphere total	1,600	2,200					93,000	92,000	
Estimated world total, excluding Russia and China	32,500	33,300					5,149,000	5,613,000	

Bureau of Agricultural Economics. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere are combined with those of the Southern Hemisphere which immediately follow; thus for 1930–31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

[1] Preliminary.
[2] 4-year average.
[3] Does not include potatoes grown with other crops.

TABLE 239.—*Potatoes, early commercial crop: Acreage, production, and price per bushel, by States, 1928–1931*

Group and State	Acreage				Production				Seasonal farm price per bushel			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	Acres	*Acres*	*Acres*	*Acres*	*1,000 bush.*[1]	*1,000 bush.*[1]	*1,000 bush.*[1]	*1,000 bush.*[1]	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Fall: Texas	300	750	650	3,500	18	38	51	245	1.42	1.05	1.80	1.05
Early (sec. 1):												
Florida	30,000	22,000	31,000	26,900	3,751	2,587	2,489	3,559	1.49	1.81	1.86	1.07
South	7,000	4,640	4,800	4,300	350	348	418	366	2.10	2.20	2.50	1.60
North	23,000	17,360	26,200	22,600	3,401	2,239	2,071	3,193	1.43	1.75	1.73	1.01
Hastings	20,800	15,820	22,500	18,600	3,120	2,057	1,710	2,548	1.44	1.75	1.75	1.04
La Crosse	1,850	1,190	3,200	3,000	228	159	320	495	1.41	1.74	1.65	1.00
West	350	350	500	1,000	53	23	41	150	.75	1.52	1.48	.52
Texas, lower Rio Grande valley	10,520	9,800	15,000	13,650	736	980	1,530	996	1.72	1.65	1.75	1.31
Group total	40,520	31,800	46,000	40,550	4,487	3,567	4,019	4,555	1.53	1.76	1.82	1.12
Early (sec. 2):												
Alabama	17,700	7,500	11,800	14,600	1,504	668	1,180	2,044	.75	1.45	1.45	.48
California	22,650	10,300	11,300	15,700	2,741	1,339	2,090	2,590	.61	1.22	1.20	.87
Georgia	2,500	1,200	2,200	2,500	225	156	330	450	.80	1.35	1.40	.65
Louisiana	21,800	15,000	22,000	30,800	1,526	900	1,650	2,834	1.00	1.50	1.35	.50
Mississippi	1,000	700	900	1,900	90	61	66	205	1.12	1.45	1.53	.47
South Carolina	24,000	15,000	16,600	17,700	3,360	2,130	2,490	2,920	.56	1.30	1.28	.67
Texas	13,580	8,960	15,950	19,300	895	520	1,425	1,760	.70	1.30	1.27	.63
Eagle Lake-Sugarland-Wharton	9,550	7,060	10,350	12,400	621	353	932	1,091	.74	1.38	1.30	.68
Other counties	4,030	1,900	5,600	6,900	274	167	493	669	.61	1.12	1.21	.55
Group total	103,230	58,660	80,750	102,500	10,341	5,774	9,231	12,803	.69	1.33	1.30	.63
Second early:												
Arkansas	6,030	3,440	4,700	6,500	555	310	494	552	.53	1.00	1.15	.45
Maryland	11,500	9,000	10,400	9,000	1,863	1,440	1,290	1,170	.33	1.20	.85	.48
North Carolina	46,400	27,500	31,500	33,500	6,403	3,438	4,410	5,192	.54	1.00	1.30	.52
Oklahoma	17,000	12,000	11,000	11,750	1,428	1,080	1,408	990	.37	.95	1.10	.50
Tennessee	2,000	1,500	1,700	2,200	228	156	136	99	.60	1.16	1.20	.65
Virginia	90,900	68,600	81,700	76,810	15,903	11,636	11,893	10,626	.41	1.17	.98	.55
Norfolk district	14,000	10,700	12,400	11,150	2,100	1,498	1,736	1,617	.41	1.15	1.15	.53
Eastern Shore	71,700	54,000	65,000	61,100	13,049	9,612	9,555	8,371	.41	1.18	.94	.55
Other	5,200	3,900	4,300	4,560	754	526	602	638	.41	1.14	1.10	.59
Group total	173,830	122,040	141,000	139,760	26,380	18,060	19,631	18,638	.44	1.13	1.06	.53
Intermediate:												
Kansas	18,760	15,800	15,300	16,300	3,613	1,965	2,724	2,138	.25	1.11	.71	.51
Kaw Valley	18,160	13,900	14,300	15,500	3,505	1,585	2,574	1,938	.25	1.08	.70	.49
Scott County	600	1,900	1,000	800	108	380	150	200	.40	1.25	.90	.75
Kentucky	5,340	4,270	5,250	5,200	1,041	705	341	468	.38	1.35	.90	.59
Missouri	6,400	4,610	5,070	5,320	1,280	553	1,039	718	.38	1.10	.80	.63
Nebraska	1,900	1,750	1,650	1,600	285	262	280	416	.50	1.20	1.10	.70
New Jersey	35,000	29,000	29,000	32,000	5,670	3,915	6,235	6,400	.45	1.60	.88	.60
Group total	67,400	55,430	56,270	60,420	11,889	7,400	10,619	10,140	.38	1.40	.84	.59
Total, all States	385,280	268,680	324,670	346,730	53,115	34,839	43,551	46,381	.57	1.28	1.13	.63

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

[1] Bushels containing approximately 60 pounds.

TABLE 240.—*Potatoes: International trade, average 1925–1929, annual 1927–1930*

Country	Calendar year									
	Average 1925–1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Netherlands	17,967	659	16,987	748	17,833	1,231	21,077	388	20,602	373
Belgium	9,012	5,090	6,951	3,813	14,027	4,197	10,904	8,132	9,726	9,477
Italy	7,761	1,933	8,294	505	7,612	4,265	5,642	4,223	4,853	1,960
Canada	7,118	688	7,687	504	6,309	708	7,145	1,189	7,128	844
Poland	3,855	12	5,103	8	2,929	8	3,240	8	1,478	4
Hungary	2,773	262	2,663	210	2,255	435	2,716	464	1,895	92
Spain	2,341	1,226	1,931	949	2,624	1,800	3,602	1,917	2,576	762
Argentina	2,138	213	2,966	33	1,901	42	2,338	482	2,616	558
Algeria	1,475	1,413	1,152	1,381	1,396	1,783	1,479	1,423	1,552	[2] 1,898
Czechoslovakia	1,062	951	2,729	1,498	1,208	534	1,147	438	347	443
Estonia	886	1	1,310	3	1,380	1	490	0	412	0
Irish Free State	865	647	1,018	566	1,351	322	579	762	333	535
Russia [2]	756	[3] 9	1,066	6	2,495	-------	157	-------	1	-------
Japan	606	0	733	0	734	0	603	0	752	0
China	193	0	124	0	187	0	312	0	365	0
Total	58,808	13,104	60,714	10,224	64,241	15,326	61,431	19,426	54,636	16,946
PRINCIPAL IMPORTING COUNTRIES										
Germany	5,346	16,623	2,537	23,484	6,684	17,956	4,170	11,305	3,671	11,755
United Kingdom	2,779	14,071	3,039	10,838	1,854	17,727	5,450	10,844	2,066	10,736
France	9,850	12,205	9,347	9,821	12,653	14,422	8,715	15,538	7,550	9,191
United States	2,434	4,284	2,379	5,272	2,698	3,710	2,735	4,276	1,899	5,060
Cuba	75	3,903	78	4,076	151	3,616	90	3,428	83	2,393
Austria	865	2,596	194	2,424	3,001	2,066	966	2,401	223	1,625
Switzerland	4	2,326	3	1,887	5	2,822	3	2,044	1	3,336
Portugal	120	1,748	46	1,403	59	2,397	70	2,363	[2] 63	[2] 2,489
Uruguay	1	1,483	1	1,452	2	1,210	0	1,587	[2] 1	[2] 1,846
Brazil	0	1,182	0	1,314	0	1,023	0	1,488	0	1,093
Egypt	139	845	101	853	247	753	195	949	43	765
Denmark	67	719	47	740	38	1,981	46	301	38	341
Finland	1	624	2	327	0	738	0	928	0	256
Yugoslavia	98	469	82	519	67	652	29	938	67	84
Sweden	36	422	158	615	1	1,082	0	32	1	74
Tunis	2	411	2	436	3	409	1	489	2	510
Philippine Islands	0	358	0	345	0	382	0	406	0	340
Venezuela	0	161	0	142	0	228	0	273	0	-------
Norway	44	62	87	52	15	99	24	3	21	1
Total	21,861	64,492	18,103	66,000	27,478	73,273	22,494	59,593	15,729	51,895

Bureau of Agricultural Economics. Official sources except where otherwise noted. These figures do not include sweetpotatoes.

[1] Preliminary. [2] International Yearbook of Agricultural Statistics. [3] 3-year average.

TABLE 241.—*Potatoes: Estimated average price per bushel received by producers United States, 1922–23 to 1931–32*

Crop year	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	109.0	101.4	78.8	66.2	60.5	58.8	62.0	64.2	68.6	77.4	79.0	79.8	75.3
1923–24	102.9	120.8	109.6	91.4	82.5	81.5	86.4	88.1	87.8	91.1	91.3	100.7	94.6
1924–25	109.0	111.3	81.0	68.8	63.5	64.1	70.2	72.3	71.4	70.5	70.6	84.4	77.9
1925–26	125.5	155.4	121.1	125.6	198.4	201.5	220.5	226.0	225.6	270.5	244.8	190.1	183.4
1926–27	174.6	140.5	130.6	126.4	141.3	137.0	139.1	134.1	127.0	126.8	146.0	191.0	142.0
1927–28	183.1	146.3	107.4	97.9	95.4	94.1	93.6	96.2	113.1	116.8	103.3	83.6	108.1
1928–29	77.4	71.9	64.8	58.0	56.9	57.7	58.9	59.5	58.4	55.3	59.3	63.7	62.0
1929–30	88.0	139.1	136.0	138.2	134.8	135.3	137.8	139.1	136.3	145.8	149.9	148.6	136.1
1930–31	129.4	108.8	109.9	101.4	95.0	89.8	90.3	86.7	84.9	90.8	87.0	75.3	95.5
1931–32	82.5	76.7	60.1	45.8	45.3	45.7	------	------	------	------	------	------	--------

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by car-lot shipments. Mean of prices reported on 1st of month and 1st of succeeding month, July, 1922–December, 1923. For previous data see 1930 or earlier Yearbooks.

TABLE 242—*Potatoes: Average price [1] per 100 pounds in car lots to jobbers, Chicago, 1922–23 to 1931–32*

Crop season [2]	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	[3] 4.48	[3] 3.80	3.11	2.21	1.64	1.18	1.00	.88	.88	.91	.96	1.17	1.27	1.02
1923–24	------	[3] 4.80	3.21	2.78	2.18	1.69	1.06	.99	1.06	1.40	1.34	1.36	1.32	1.27
1924–25	[3] 6.27	2.88	2.51	1.80	1.39	1.32	.96	.98	1.20	1.13	1.11	1.09	.84	1.16
1925–26	[3] 4.75	3.42	2.96	3.21	2.68	1.99	2.66	3.45	3.65	4.03	3.74	4.01	4.51	3.09
1926–27	[3] 8.59	[3] 6.57	3.91	2.35	2.22	2.45	2.47	2.41	2.23	2.28	1.98	1.96	2.11	3.18
1927–28	[3] 4.52	4.48	4.65	2.30	2.02	1.70	1.53	1.53	1.53	1.52	1.78	2.17	1.85	1.40
1928–29	[3] 5.95	2.94	1.74	1.15	1.06	1.04	.91	.89	.92	1.00	1.00	.85	.71	.81
1929–30	[3] 3.94	4.04	2.71	2.78	2.43	2.49	2.40	2.31	2.34	2.57	2.49	2.44	2.87	2.76
1930–31	4.48	3.57	3.01	1.82	1.89	2.10	1.77	1.62	1.55	1.63	1.50	1.59	1.66	1.29
1931–32	[3] 4.45	2.30	1.56	1.58	1.45	1.05	.90	.92	1.02	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from daily market reports from bureau representatives in the various markets. Average prices as shown are based on stock of U. S. No. 1 grade; they are simple averages of daily range of selling prices. In some cases conversions were made from larger to smaller units, or vice versa, in order to obtain comparability.

[1] Prices do not include Russet Burbanks.
[2] Crop-movement season extends from April of one year through May of the following year, with irregular quotations continuing through June and July.
[3] Less-than-car lot-sales to jobbers.

TABLE 243.—*Sweetpotatoes: Acreage and production, by States, average 1924–1928, annual 1928–1931*

State	Acreage					Production				
	Average, 1924–1928	1928	1929	1930	1931 [1]	Average, 1924–1928	1928	1929	1930	1931 [1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*	*1,000 bush.*
New Jersey	13	13	12	12	13	1,666	1,690	1,500	1,440	1,950
Indiana	2	3	3	2	4	275	345	390	190	540
Illinois	6	5	5	5	6	498	450	480	400	636
Iowa	2	2	2	3	3	192	230	168	285	300
Missouri	8	8	10	9	10	772	760	900	765	900
Kansas	4	4	4	5	6	510	540	480	525	570
Delaware	6	6	6	7	8	809	870	888	525	1,400
Maryland	8	9	9	9	11	1,348	1,710	1,629	630	2,013
Virginia	35	36	36	37	38	4,651	5,184	5,076	2,960	4,750
North Carolina	64	62	60	75	80	6,185	6,076	6,720	6,750	6,560
South Carolina	44	46	47	49	53	3,392	3,910	5,029	4,655	3,180
Georgia	86	84	85	79	91	6,273	6,132	7,905	6,320	4,550
Florida	21	20	20	19	21	1,813	1,700	1,820	1,520	1,638
Kentucky	15	14	14	13	21	1,257	1,120	1,274	845	2,100
Tennessee	49	50	54	54	68	4,820	4,700	5,508	4,536	5,440
Alabama	64	64	68	68	78	5,470	6,080	6,664	5,780	5,304
Mississippi	52	49	53	45	63	4,677	4,900	6,148	3,825	5,355
Arkansas	26	23	22	23	32	2,565	2,070	1,870	1,932	2,880
Louisiana	64	62	67	60	72	4,687	4,650	4,958	4,200	5,400
Oklahoma	16	18	16	17	19	1,583	1,602	1,344	1,190	1,330
Texas	44	48	45	47	69	3,424	3,744	3,420	3,290	4,968
Arizona	1	1	--------	--------	--------	133	142	--------	--------	--------
California	10	11	8	10	12	957	1,045	792	1,100	1,140
United States	642	638	646	648	778	57,956	59,650	64,963	53,663	62,904

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

[1] Preliminary

TABLE 244.—*Sweetpotatoes: Acreage, production, and value, United States, 1919–1931*

Year	Acreage	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value Dec. 1	Year	Acreage	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value Dec. 1
	1,000 acres	*Bushels*	*1,000 bushels*	*Cents*	*1,000 dollars*		*1,000 acres*	*Bushels*	*1,000 bushels*	*Cents*	*1,000 dollars*
1919	792	99.0	78,422	133.6	104,746	1925	637	78.9	50,241	134.9	67,752
1920	768	100.4	77,124	112.9	87,072	1926	646	98.3	63,531	93.8	59,612
1921	819	90.3	73,958	88.2	65,204	1927	724	98.3	71,156	82.7	58,856
1922	819	96.1	78,665	76.6	60,262	1928	638	93.5	59,650	90.9	54,218
1923	675	94.9	64,041	98.1	62,831	1929	646	100.6	64,963	93.9	60,982
1924	*467*	*80.2*	*37,444*	--------	--------	1930	648	82.8	53,663	90.0	48,323
1924	567	79.7	45,201	127.4	57,600	1931 [1]	778	80.9	62,904	57.4	36,132

Bureau of Agricultural Economics. Acreage, yield, and production figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text; italic figures are census returns. Prices are based upon returns from crop reporters.

[1] Preliminary.

TABLE 245.—*Sweetpotatoes: Yield per acre and estimated price per bushel December 1, by States, averages, and annual 1926–1931*

State	Yield per acre							Estimated price per bushel Dec. 1						
	Average, 1919–1928	1926	1927	1928	1929	1930	1931	Average, 1925–1929	1926	1927	1928	1929	1930	1931
	Bush.	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
New Jersey	124	135	110	130	125	120	150	148	120	120	120	140	120	70
Indiana	118	120	110	115	130	95	135	147	145	135	130	135	135	70
Illinois	90	100	90	90	96	80	106	136	135	115	110	130	115	60
Iowa	91	95	85	115	84	95	100	181	200	150	155	170	180	90
Missouri	96	104	101	95	90	85	90	128	130	120	105	120	110	75
Kansas	122	125	135	135	120	105	95	132	135	110	110	135	110	75
Delaware	135	140	115	145	148	75	175	99	65	70	80	90	90	35
Maryland	146	165	165	190	181	70	183	97	75	70	80	90	90	50
Virginia	130	125	140	144	141	80	125	95	100	85	70	90	100	35
North Carolina	100	91	114	98	112	90	82	95	100	80	85	90	90	55
South Carolina	84	77	97	85	107	95	60	99	100	80	85	85	80	65
Georgia	80	86	81	73	93	80	50	89	80	75	85	80	75	65
Florida	87	90	85	85	91	80	78	114	125	85	115	105	95	70
Kentucky	90	105	85	80	91	65	100	123	108	120	115	120	120	70
Tennessee	103	122	99	94	102	84	80	97	70	85	95	95	90	55
Alabama	86	95	90	95	98	85	68	95	85	85	90	90	85	65
Mississippi	91	95	104	100	116	85	85	89	95	80	90	80	75	50
Arkansas	98	108	116	90	85	84	90	101	95	80	90	115	95	55
Louisiana	77	80	85	75	74	70	75	89	90	70	85	85	90	50
Oklahoma	97	105	106	89	84	70	70	105	100	80	95	115	100	70
Texas	82	88	85	78	76	70	72	103	95	75	100	105	95	60
Arizona	139	150	120	142	------	------	------	197	155	200	200	------	------	------
California	106	90	95	95	99	110	95	130	110	115	110	145	105	80
United States	92.9	98.3	98.3	93.5	100.6	82.8	80.9	99.3	93.8	82.7	90.9	93.9	90.0	57.4

Bureau of Agricultural Economics. Yield figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text. Prices are based upon returns from crop reporters.

TABLE 246.—*Sweetpotatoes: Car-lot shipments, by State of origin, 1921–22 to 1930–31*

State	Crop-movement season [1]									
	1921–22	1922–23	1923–24	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31 [2]
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
New Jersey [3]	2,196	2,857	1,528	1,894	1,357	1,770	1,225	1,223	1,090	1,078
Indiana [3]	62	65	75	103	236	284	209	231	352	355
Delaware	1,722	2,632	1,549	1,750	1,742	1,885	1,517	1,470	1,454	771
Maryland	1,286	1,750	1,123	1,155	1,520	2,283	2,256	2,106	1,859	975
Virginia [3]	5,300	6,633	5,374	5,213	4,750	6,501	6,618	6,480	7,090	5,361
North Carolina [3]	1,022	680	563	816	1,510	1,683	1,711	760	729	883
South Carolina [3]	135	236	154	120	231	162	276	130	375	284
Georgia [3]	1,400	781	610	1,018	674	678	667	227	[5] 527	348
Florida	112	123	[4] 62	175	241	185	159	69	[5] 125	114
Kentucky [3]	85	55	30	31	90	302	185	121	268	222
Tennessee [3]	1,578	1,495	726	1,137	2,592	4,972	3,587	2,915	3,692	2,903
Alabama	591	537	382	649	663	515	574	393	570	320
Mississippi	181	116	61	36	156	79	211	126	271	219
Arkansas [3]	584	240	263	371	476	548	392	316	207	176
Louisiana [3]	893	1,033	463	558	2,340	1,285	1,147	981	1,463	1,224
Oklahoma	147	85	110	107	216	268	294	255	102	78
Texas	759	974	535	221	485	702	1,284	717	802	717
California	1,000	982	684	466	1,161	1,186	805	767	728	869
Other States [3]	332	288	240	247	419	467	306	258	338	427
Total [3]	19,385	21,562	14,532	16,067	20,859	25,755	23,423	19,545	22,042	17,324

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

[1] Crop movement season extends from July 1 of one year through June of the following year.
[2] Preliminary.
[3] Figures for certain States include shipments in July of succeeding crop year as follows: New Jersey, 1922–23, 3 cars; Indiana, 1926–27, 1 car; Virginia, 1928–29, 1 car; North Carolina, 1226–27, 3 cars, 1927–28, 10 cars; South Carolina, 1922–23, 1 car; Georgia, 1927–28, 2 cars; Kentucky, 1921–22, 1 car, 1926–27, 12 cars, 1928–29, 5 cars, 1930–31, 5 cars; Tennessee, 1921–22, 17 cars, 1924–25, 3 cars, 1925–26, 11 cars, 1926–27, 309 cars, 1927–28, 6 cars, 1928–29, 135 cars, 1929–30, 10 cars, 1930–31, 33 cars; Arkansas, 1921–22, 1 car, 1926–27, 1 car, 1930–31, 1 car; Louisiana, 1926–27, 1 car; New Mexico, 1921–22, 5 cars, 1928–29, 1 car, 1930–31, 2 cars; Tennessee, 1926–27, 19 cars in August.
[4] Includes 3 cars in June, 1923.
[5] Includes 10 cars in June, 1929.

TABLE 247.—*Sweetpotatoes: Estimated average price per bushel received by producers, United States, 1922–23 to 1931–32*

Crop year	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	125.3	127.5	106.0	90.4	79.0	84.8	92.5	96.9	100.1	103.8	107.9	107.4	97.4
1923–24	112.1	151.3	133.6	114.8	101.0	103.8	112.5	123.7	129.0	140.4	139.2	138.9	121.7
1924–25	130.7	151.4	157.0	145.1	130.3	140.1	145.5	160.2	180.8	196.2	189.1	170.2	152.4
1925–26	188.7	196.3	177.4	169.4	144.4	141.5	149.3	162.4	171.4	180.4	192.2	198.8	165.9
1926–27	185.6	189.0	153.9	110.6	88.5	94.0	97.8	109.0	112.3	112.8	118.9	136.0	120.3
1927–28	136.4	146.7	121.9	98.1	86.5	91.9	93.4	98.0	109.6	115.1	121.4	124.7	106.5
1928–29	119.5	131.0	120.9	111.2	100.2	101.8	104.2	113.7	117.0	120.8	125.9	129.8	113.1
1929–30	135.9	136.2	127.9	112.5	97.7	98.9	103.1	109.6	114.6	118.3	126.4	128.6	113.7
1930–31	125.0	136.3	128.7	110.7	93.8	94.1	98.1	100.8	105.5	113.7	115.2	108.5	109.9
1931–32	101.1	107.8	81.4	66.1	58.2	58.5	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by average monthly marketings. For previous data see 1930 or earlier Yearbooks.

TABLE 248.—*Spinach, commercial crop: Acreage, production, and price per bushel or ton, 1928–1931*

Utilization	Acreage				Production				Seasonal farm price			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	Acres	*Acres*	*Acres*	*Acres*	*1,000 bush.*[1]	*1,000 bush.*[1]	*1,000 bush.*[1]	*1,000 bush.*[1]	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
For market	44,520	50,190	46,530	49,570	11,251	15,042	11,353	13,706	0.60	0.45	0.54	0.40
					Tons[2]	*Tons*[2]	*Tons*[2]	*Tons*[2]				
For manufacture	14,640	18,170	9,350	7,850	73,200	96,900	38,400	34,700	17.51	16.76	14.79	12.82
Total	59,160	68,360	55,880	57,420	185,710	247,320	151,930	171,760	43.00	33.80	43.90	34.16

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and canning establishments.

[1] Bushels containing approximately 20 pounds.
[2] Short ton.

TABLE 249.—*Strawberries, commercial crop: Acreage, production, and price per quart, by States, 1928–1931*

Group and State	Acreage				Production [1]				Seasonal farm price per crate			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	Acres	*Acres*	*Acres*	*Acres*	*1,000 crates*[2]	*1,000 crates*[2]	*1,000 crates*[2]	*1,000 crates*[2]	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Early:												
Alabama	5,380	6,820	6,930	3,850	495	518	298	424	3.80	2.40	3.10	2.90
Florida	4,500	6,800	9,000	9,100	229	544	603	655	8.40	5.30	6.70	5.75
Louisiana	23,200	24,360	24,600	24,600	1,392	1,437	1,181	1,870	5.50	5.00	5.50	4.55
Mississippi	1,000	1,080	1,240	1,400	63	73	51	105	4.30	3.35	2.65	2.75
Texas	1,600	3,160	2,030	1,550	102	123	73	136	4.80	2.90	4.30	6.25
Group total	35,680	42,220	43,800	40,500	2,281	2,695	2,206	3,190	5.36	4.42	5.40	4.59
Second early:												
Arkansas	21,600	22,000	15,300	9,000	929	1,122	474	531	2.40	2.60	3.60	2.55
California (S. Dist.)	1,600	1,280	1,800	1,740	347	266	385	353	4.10	4.30	3.85	3.85
Georgia	400	400	300	250	19	18	14	20	2.90	2.90	2.60	2.65
North Carolina	7,500	7,000	5,400	5,300	818	679	437	636	2.90	3.10	2.90	2.65
South Carolina	300	500	360	320	30	34	24	27	2.90	3.35	2.90	2.65
Tennessee	18,080	16,810	12,600	10,000	1,012	1,076	617	590	1.90	2.40	3.10	2.50
Virginia	9,980	8,980	7,900	5,520	968	682	403	370	2.40	2.60	2.60	2.70
Group total	59,460	56,970	43,660	32,130	4,123	3,877	2,354	2,527	2.53	2.76	3.20	2.77
Intermediate:												
California, (other)	2,150	2,280	2,250	2,450	372	326	484	502	3.60	3.85	3.60	3.35
Delaware	4,930	4,830	4,100	2,460	532	469	242	140	1.90	2.60	2.90	2.60
Illinois	4,700	4,790	4,070	4,270	258	283	183	205	2.90	2.15	3.60	3.00
Kansas	960	960	860	860	19	64	34	48	3.35	2.40	3.60	2.40
Kentucky	8,720	6,240	4,250	3,530	523	443	217	194	2.40	2.60	4.30	3.75
Maryland	13,800	11,750	9,400	6,080	925	905	498	365	1.70	2.60	2.90	2.75
Missouri	26,490	21,990	15,000	12,150	1,166	1,209	495	352	2.60	2.60	4.55	3.00
New Jersey	4,000	4,000	4,500	5,000	364	276	306	400	2.40	2.40	3.80	2.50
Oklahoma	1,550	1,900	1,400	1,120	51	76	38	28	1.90	2.40	3.35	3.50
Group total	67,300	58,740	45,830	37,920	4,210	4,051	2,497	2,234	2.37	2.65	3.66	2.98
Late:												
Indiana	1,680	1,510	1,540	1,350	136	119	57	112	2.40	3.10	3.80	2.50
Iowa	2,560	2,690	2,770	2,700	131	172	166	176	3.60	4.30	4.55	2.90
Michigan	6,090	6,940	7,220	7,250	371	361	455	616	3.60	4.30	4.55	2.45
New York	4,480	4,300	4,390	4,600	327	378	386	492	4.10	4.10	4.55	2.60
Ohio	3,700	4,370	4,280	3,100	248	310	154	208	4.30	3.10	4.55	2.85
Oregon	10,000	10,500	9,450	9,930	780	693	567	695	3.10	3.60	3.35	2.90
Pennsylvania	3,190	2,870	2,900	2,670	348	261	206	248	3.35	3.35	3.80	2.50
Utah	1,400	1,510	1,510	1,510	118	106	106	60	2.90	2.90	2.90	4.10
Washington	8,900	7,900	7,500	7,880	703	529	338	528	4.10	2.90	3.60	2.90
Wisconsin	2,840	2,840	2,840	2,900	128	258	145	200	5.00	3.60	4.80	2.45
Group total	44,840	45,430	44,400	43,890	3,290	3,187	2,580	3,335	3.64	3.55	4.03	2.72
Total all States	207,280	203,360	177,690	154,440	13,904	13,810	9,637	11,286	3.21	3.23	4.04	3.31

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

[1] Includes undetermined quantities used for canning, cold pack, etc.
[2] 24-quart crates containing approximately 36 pounds.

TABLE 250.—*Strawberries: Car-lot shipments, by State of origin, 1927–1931*

Group and State	Calendar year 1927	1928	1929	1930	1931[1]
	Cars	*Cars*	*Cars*	*Cars*	*Cars*
Early:					
Ala	901	1,021	1,354	771	1,154
Fla.[2]	618	545	1,633	1,721	1,862
La	1,659	2,850	2,859	2,389	4,720
Miss	65	88	115	74	129
Tex	126	148	253	92	65
Other States	------	------	1	6	3
Second early:					
Ark	2,049	2,046	2,488	688	578
Calif., southern district	35	18	10	16	13
N. C.	2,202	2,151	1,483	756	1,228
S. C.	33	71	30	9	44
Tenn	2,425	2,180	2,151	1,158	1,066
Va	1,104	984	849	335	527
Other States	20	23	17	9	14
Intermediate:					
Calif., other	147	141	162	203	174
Del	915	621	418	203	111
Ill	176	324	273	163	119
Intermediate:					
Ind	44	126	105	33	64
Iowa	41	19	52	48	36
Kans	57	2	63	29	23
Ky	976	1,078	851	404	395
Md	1,515	980	734	424	353
Mo	1,986	2,637	2,062	807	692
N. J	134	186	176	106	60
Okla	33	46	111	39	3
Late:					
Mass	67	35	47	44	21
Mich	114	61	79	57	53
N. Y	189	70	55	31	58
Oreg	110	99	103	35	37
Wash	93	106	61	12	23
Wis	31	39	26	7	8
Other States	28	20	5	------	9
Total	17,893	18,715	18,626	10,669	13,642

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

[1] Preliminary.
[2] Figures for Florida include shipments in December of preceding year as follows: 1927, 2 cars; 1929, 1 car; 1930, 107 cars; 1931, 16 cars.

TABLE 251.—*Tomatoes: United States commerical production, imports and exports, annual, 1923–1931*

Year	Commercial production		Imports, year beginning July				Exports, year beginning July	
	For market	For manufacture	Fresh	Canned	Otherwise prepared	Paste	Canned	Catsup and sauces
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
1923	972,300	2,330,600	[1] 50,838	30,946	[1] 1,341	[1] 4,164	9,152	[1] 3,560
1924	1,043,300	2,380,400	69,216	73,902	9,443	17,382	5,203	5,520
1925	1,095,800	3,618,400	82,448	84,897	(2)	18,179	5,794	5,003
1926	762,400	1,997,200	124,489	80,257	----------	15,642	7,504	7,556
1927	976,300	2,391,800	113,357	103,782	----------	12,064	6,725	8,584
1928	871,000	1,969,600	128,627	114,042	----------	9,539	4,009	13,066
1929	938,400	3,025,400	139,886	147,429	----------	16,547	4,872	10,419
1930	946,500	3,491,200	113,480	75,173	----------	11,605	2,916	5,210
1931	925,600	2,029,200	----------	----------	----------	----------	----------	----------

Bureau of Agricultural Economics. Production figures based upon returns from crop reporters and canning establishments; imports and exports compiled from Monthly Summary of Foreign Commerce of the United States, June issues.

[1] January-June, 1924.
[2] From 1926 on included with "tomatoes, canned."

TABLE 252.—*Tomatoes, commercial crop: Acreage, production, and price per bushel or ton, 1928–1931*

Utilization, marketing season, and State	Acreage				Production				Seasonal farm price			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
For market:	*Acres*	*Acres*	*Acres*	*Acres*	*1,000 bushels* [1]	*1,000 bushels* [1]	*1,000 bushels* [1]	*1,000 bushels* [1]	*Dols.*	*Dols.*	*Dols.*	*Dols.*
Fall	1, 200	5, 300	3, 980	6, 870	74	344	264	439	2. 36	2. 67	2. 39	2. 23
Early (sec. 1)	11, 640	14, 700	11, 800	8, 300	1, 339	1, 323	1, 298	772	3. 54	3. 00	3. 60	2. 15
Early (sec. 2)	25, 750	29, 400	29, 600	27, 300	2, 456	2, 214	2, 079	2, 149	3. 16	2. 48	3. 09	1. 30
Second early	29, 840	26, 790	34, 130	39, 050	3, 077	3, 287	[2] 3, 967	3, 857	1. 67	2. 15	1. 26	1. 01
Intermediate	33, 660	32, 630	35, 500	39, 120	4, 335	4, 952	4, 443	[2] 4, 790	1. 15	1. 54	1. 15	. 80
Late (sec. 1)	22, 820	25, 920	30, 840	31, 670	3, 352	3, 987	4, 052	4, 012	1. 15	1. 11	1. 16	1. 01
Late (sec. 2)	14, 150	8, 350	10, 500	8, 500	920	651	798	510	2. 00	1. 95	1. 43	1. 96
Total	139, 060	143, 090	156, 350	160, 810	15, 553	16, 758	[2] 16, 901	[2] 16, 529	1. 83	1. 84	1. 64	1. 10
For manufacture:					*Tons* [3]	*Tons* [3]	*Tons* [3]	*Tons* [3]				
New York	12, 500	13, 600	15, 500	11, 300	73, 800	85, 700	77, 500	91, 500	15. 20	15. 70	15. 40	13. 30
New Jersey	33, 000	33, 000	43, 000	30, 000	118, 800	214, 500	258, 000	132, 000	18. 50	21. 00	19. 40	15. 60
Pennsylvania	3, 600	3, 420	5, 400	4, 300	13, 000	13, 700	16, 200	15, 500	14. 50	15. 00	15. 40	13. 10
Ohio	10, 400	10, 950	12, 400	10, 300	60, 300	52, 600	67, 000	61, 800	11. 60	12. 00	12. 00	9. 70
Indiana	49, 870	59, 840	79, 000	64, 000	149, 600	251, 300	395, 000	192, 000	12. 90	13. 20	13. 30	10. 00
Illinois	5, 130	5, 440	6, 500	4, 650	17, 400	20, 700	20, 800	22, 300	13. 00	13. 00	13. 40	12. 00
Michigan	1, 660	1, 990	2, 600	2, 000	9, 600	9, 000	14, 000	14, 000	11. 00	12. 00	12. 00	9. 80
Iowa	4, 810	4, 570	6, 400	6, 400	16, 800	25, 100	32, 000	23, 000	13. 00	13. 00	13. 00	12. 30
Missouri	18, 700	20, 940	28, 900	20, 000	33, 700	60, 700	60, 700	42, 000	12. 60	13. 30	13. 70	11. 00
Delaware	13, 500	13, 500	14, 000	11, 800	32, 400	68, 800	47, 600	23, 600	17. 00	17. 00	17. 30	11. 80
Maryland	32, 000	44, 000	48, 900	38, 000	89, 600	224, 400	151, 600	76, 000	15. 70	16. 10	17. 40	12. 00
Virginia	9, 300	12, 100	15, 500	10, 800	22, 300	46, 000	43, 400	18, 400	13. 20	14. 90	15. 50	10. 30
Kentucky	5, 500	6, 400	8, 430	5, 700	11, 600	23, 700	21, 900	16, 000	12. 60	12. 60	12. 70	10. 40
Tennessee	10, 220	9, 200	14, 000	10, 700	18, 400	23, 000	33, 600	23, 500	12. 00	12. 10	13. 00	11. 00
Arkansas	19, 600	22, 600	28, 000	16, 800	43, 100	52, 000	58, 800	42, 000	12. 60	13. 50	13. 80	10. 20
Colorado	1, 600	2, 030	2, 230	2, 500	11, 800	17, 700	19, 000	17, 500	11. 00	11. 00	10. 90	10. 50
Utah	5, 650	6, 180	8, 200	6, 200	65, 500	56, 900	55, 800	51, 500	11. 00	11. 00	11. 50	10. 20
California	24, 700	41, 680	52, 250	23, 160	182, 800	241, 700	329, 200	127, 400	14. 60	15. 20	15. 10	15. 00
Other States [4]	4, 010	6, 380	12, 440	8, 800	14, 300	25, 200	43, 500	24, 600	13. 15	12. 82	13. 29	11. 32
Total	265, 750	317, 820	403, 650	287, 410	984, 800	1, 512, 700	1, 745, 600	1, 014, 600	14. 20	15. 26	15. 05	12. 10
Grand total for market and manufacture	404, 810	460, 910	560, 000	448, 220	1, 420, 284	1, 981, 924	[2] 2,218,828	[2] 1,477,412	29. 90	27. 17	24. 21	20. 59

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and canning establishments.

[1] Bushels containing approximately 56 pounds.
[2] Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.
[3] Short ton.
[4] Other States include Connecticut, Kansas, Louisiana, Mississippi, Nebraska, New Mexico, Oklahoma, Oregon, South Carolina, Texas, Washington, West Virginia, and Wisconsin.

TABLE 253.—*Tomatoes: Car-lot shipments by State of origin, 1920–1931*

State	Calendar year											
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931 [1]
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
New York	1,945	1,073	1,902	1,261	954	1,024	656	951	1,112	838	514	800
New Jersey	2,798	2,121	1,930	1,648	2,150	1,907	2,006	1,329	678	694	842	51
Ohio	450	411	558	956	1,035	1,286	1,065	1,125	926	1,020	1,007	1,373
Indiana	1,265	552	1,332	1,185	1,479	1,889	1,514	1,132	799	1,631	2,217	665
Illinois	450	155	229	250	230	539	422	270	240	237	316	315
Iowa	19	14	14	10	4	118	60	167	120	53	197	------
Missouri	17	21	19	16	195	154	96	170	196	119	139	27
Maryland	194	110	242	271	66	313	259	586	613	775	554	369
Virginia	188	91	83	44	167	379	454	360	277	488	243	157
South Carolina	------	59	145	431	421	568	449	187	161	348	461	348
Georgia	1	4	23	18	176	85	169	82	73	61	51	12
Florida [2]	4,192	5,785	10,245	9,760	9,140	7,188	4,351	9,737	8,491	8,038	6,495	5,435
Kentucky	468	341	153	121	546	498	300	203	42	244	40	------
Arkansas	11	23	47	9	38	104	281	240	389	300	318	218
Tennessee	805	370	920	501	985	1,393	2,374	2,016	2,759	2,317	2,496	2,035
Mississippi	1,393	1,945	3,441	2,144	3,776	3,149	3,492	4,849	3,230	4,099	3,451	2,683
Texas [3]	1,393	2,025	1,893	1,084	1,694	2,398	2,890	3,393	4,435	5,338	7,546	8,764
Colorado	135	38	94	128	77	195	27	20	59	55	138	195
Utah	261	100	378	369	380	1,457	272	883	899	740	342	319
Washington	66	19	58	21	33	86	35	95	143	215	336	252
California [3]	2,004	1,819	2,349	3,293	2,789	2,961	4,440	4,620	4,475	4,241	5,458	3,382
Other States	576	431	847	622	804	1,116	674	701	796	793	417	382
Total [2] [3]	18,394	17,415	26,717	23,967	26,830	28,254	26,068	32,664	30,395	32,202	33,578	27,782

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

[1] Preliminary.

[2] Figures for Florida include cars moved in preceding calendar year as follows: 1920, 14 cars in November, 34 cars in December; 1922, 10 cars in December; 1923, 26 cars in December; 1924, 2 cars in November, 55 cars in December; 1925, 14 cars in November, 31 cars in December; 1926, 7 cars in November, 13 cars in December; 1927, 1 car in December; 1928, 28 cars in November, 291 cars in December; 1929, 104 cars in November, 392 cars in December; 1930, 4 cars in November, 47 cars in December; 1931, 130 cars in November, 400 cars in December.

[3] Figures include cars in following calendar year as follows: California, 1922, 3 cars in January; 1924, 1 car in January; 1925, 1 car in January; 1929, 1 car in January; Texas, 1922, 5 cars in January, and 2 cars in February; 1925, 8 cars in January; 1926, 15 cars in January; 1927, 1 car in January; 1928, 1 car in January; 1930, 8 cars in January.

TABLE 254.—*Tomatoes, canned: Pack [1] in the United States, 1918–1931*

State	Season													
	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
	1,000 cases	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*
New York	396	437	515	214	340	266	325	389	302	300	261	329	467	497
New Jersey	667	60	517	116	337	412	186	418	204	254	95	257	356	144
Pennsylvania	[2] 441	[2] 384	[2] 680	[2] 186	[2] 644	258	150	338	118	167	95	122	151	160
Ohio	357	172	142	71	179	174	133	179	120	189	124	153	429	304
Indiana	968	876	778	530	1,312	717	1,050	1,955	900	1,131	613	1,134	2,029	1,192
Missouri	353	439	715	136	775	839	871	1,836	895	605	396	622	1,078	519
Delaware	879	189	553	176	590	1,216	803	1,272	228	827	325	851	755	340
Maryland	6,649	2,529	3,347	1,656	3,205	5,722	3,825	6,175	1,901	3,671	1,720	4,050	3,770	1,710
Virginia [3]	1,547	953	1,162	217	891	963	1,116	1,138	572	1,059	466	918	818	508
Kentucky [2]	------	------	------	------	------	59	136	275	223	253	111	167	161	161
Tennessee [2]	------	------	------	------	------	176	386	382	280	368	160	297	518	314
Arkansas [4]	------	------	------	------	------	270	768	1,168	558	678	613	769	1,050	761
Colorado [5]	306	290	218	62	168	182	180	309	183	127	158	195	293	227
Utah	953	594	444	132	664	584	417	1,353	235	792	924	768	788	1,028
California	1,790	3,052	1,773	339	1,701	2,397	1,767	1,839	2,347	2,257	1,991	2,812	3,460	864
Other States	576	835	524	182	732	437	406	744	389	459	487	701	875	844
United States	15,882	10,810	11,368	4,017	11,538	14,672	12,519	19,770	9,455	13,137	8,539	14,145	16,998	9,573

Bureau of Agricultural Economics. Compiled from National Canners' Association, 1918–1926; Bureau of Census, 1927–1929; beginning 1930, Foodstuffs Division, Bureau of Foreign and Domestic Commerce.

[1] Stated in cases of 24 No. 3 cans.

[2] Previous to 1923, Pennsylvania, Kentucky, and Tennessee composed one group.

[3] Includes West Virginia.

[4] Previous to 1923, included in "Other States."

[5] Includes Washington.

TABLE 255.—*Walnuts: Production and value, California, 1922–1931*

Year	Production	Seasonal farm price	Farm value	Year	Production	Seasonal farm price	Farm value
	Short tons	*Dollars*	*1,000 dolls.*		*Short tons*	*Dollars*	*1,000 dolls.*
1922	27,000	360.00	9,720	1927	51,000	330.00	16,830
1923	25,000	400.00	10,000	1928	25,000	420.00	10,500
1924	22,500	460.00	10,350	1929	39,000	320.00	12,480
1925	36,000	440.00	15,840	1930	30,000	410.00	12,300
1926	15,000	480.00	7,200	1931 [1]	28,000	[2] 260.00	7,280

Bureau of Agricultural Economics.

[1] Preliminary. [2] Seasonal average price to Dec. 1.

TABLE 256.—*Watermelons, commercial crop: Acreage, production, and price per 1,000 melons,* [1] *1928–1931*

Marketing season	Acreage 1928	Acreage 1929	Acreage 1930	Acreage 1931	Production 1928	Production 1929	Production 1930	Production 1931	Seasonal farm price per 1,000 melons 1928	1929	1930	1931
	Acres	*Acres*	*Acres*	*Acres*	*1,000 melons*	*1,000 melons*	*1,000 melons*	*1,000 melons*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Early	44,840	48,000	43,200	40,300	15,320	17,904	[2] 16,471	16,759	247	230	190	156
Second early	129,860	132,280	147,290	145,100	36,755	37,631	[2] 51,170	[2] 39,494	148	151	88	75
Late	31,710	36,310	45,000	53,420	12,013	14,521	14,760	19,256	149	160	129	91
Total	206,410	216,590	235,490	238,820	64,088	70,056	[2] 82,401	[2] 75,509	172	173	116	101

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

[1] Approximately 1,000 melons per car.
[2] Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

TABLE 257.—*Watermelons: Car-lot shipments, United States, 1921–1931*

Season beginning April—	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
1921	7	1,133	11,061	19,229	12,256	1,983	80		45,749
1922	8	3,566	15,291	18,003	9,061	1,616	80		47,625
1923	3	762	6,176	15,351	8,583	2,045	159	2	33,081
1924	[3] 2	65	6,602	26,024	10,470	2,458	120	4	45,745
1925		605	11,767	17,814	11,524	2,390	82	2	44,184
1926		443	11,424	29,873	11,497	1,861	28		55,126
1927	4	1,713	15,255	20,898	6,262	1,261	67		45,460
1928		508	10,410	24,937	11,408	1,183	50	1	48,497
1929	36	3,498	22,047	18,287	7,582	1,007	57		52,514
1930		386	17,830	29,028	10,306	1,359	102		59,011
1931 [2]		121	16,161	23,610	10,362	1,610	56		51,920

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

[1] Crop-movement season extends from Apr. 1 through November of a given year.
[2] Preliminary. [3] Reported as shipped in January.

TABLE 258.—*Watermelons, Tom Watson: Price per car to jobbers, Chicago and New York, 1924–1931* [1]

Market and season [2]	June	July	August	Market and season [2]	June	July	August
Chicago:	*Dollars*	*Dollars*	*Dollars*	New York:	*Dollars*	*Dollars*	*Dollars*
1924	576	249	291	1924	474	[3] 270	[3] 273
1925	576	362	[4] 211	1925	[3] 512	[3] 311	202
1926	623	281	[4] 202	1926	460	248	180
1927	471	289		1927	435	289	237
1928	445	301	252	1928	378	262	216
1929	365	339		1929	368	278	[4] 234
1930	511	271	269	1930	469	214	211
1931	426	273		1931	[5] 427		

Bureau of Agricultural Economics. Compiled from daily market reports from bureau representatives in the various markets. Average prices as shown are based on stock of good merchantable quality and condition; they are simply averages of daily range of selling prices.

[1] Quotations are for southeastern, 22 to 26 pound average.
[2] Commodity reports were issued for season as follows: 1924, June 6–Aug. 30; 1925, May 28–Sept. 5; 1926, May 28–Sept. 1; 1927, May 16–Aug. 26; 1928, May 21–Aug. 24; 1929, May 9–Aug. 31; 1930, May 26–Aug. 16, 1931, June 8–Sept. 1. [3] Auction sales. [4] Thurmond Gray. [5] Less than 10 quotations.

TABLE 259.—*Fruits and vegetables: Unloads of 18 commodities at 12 markets, in car lots, 1930 and 1931 and total 1924–1931*

Commodity and calendar year	New York	Chicago	Philadelphia	Boston	Detroit	Pittsburgh	St. Louis	Los Angeles	Cleveland	Baltimore	Cincinnati	San Francisco
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
Apples:												
1930	10,685	5,891	2,419	1,252	2,038	2,800	1,087	4,011	1,384	569	1,375	875
1931	11,470	6,193	2,349	1,769	2,242	2,060	554	3,650	1,101	351	952	682
Cabbage:												
1930	6,024	1,866	2,450	1,221	814	1,443	1,290	14	660	1,573	769	3
1931	5,757	1,963	2,928	1,398	899	1,217	1,409	181	584	1,468	665	3
Cantaloupes: [1]												
1930	9,209	3,214	2,415	2,010	1,140	1,411	872	510	1,096	600	707	589
1931	9,184	2,942	2,332	1,972	1,141	1,547	802	380	1,078	627	647	500
Celery:												
1930	4,654	1,892	1,802	947	830	991	674	79	442	769	394	432
1931	4,177	1,560	1,639	819	824	882	565	86	403	714	385	344
Grapefruit:												
1930	6,150	1,868	1,310	1,088	643	597	509	120	572	546	373	352
1931	7,347	2,143	1,624	1,535	1,087	728	638	159	796	602	512	393
Grapes:												
1930	16,694	4,834	3,740	4,428	1,445	2,867	795	90	1,053	651	584	2,823
1931	11,637	3,213	2,647	3,244	899	1,722	541	56	519	461	417	2,080
Lemons:												
1930	4,296	1,119	840	579	454	414	467	1	385	451	401	367
1931	3,091	1,241	838	646	515	504	495	-------	405	510	431	343
Lettuce:												
1930	9,849	4,853	3,357	2,066	1,702	1,481	1,627	1,212	1,118	1,015	712	318
1931	8,771	4,341	3,162	1,942	1,562	1,259	1,344	835	1,127	849	652	294
Onions:												
1930	7,285	2,283	2,408	2,145	1,453	1,141	924	606	878	702	549	671
1931	6,764	1,897	2,161	1,877	850	934	853	862	631	609	450	901
Oranges:												
1930	13,220	4,932	4,130	3,959	2,032	1,945	1,219	203	1,665	1,372	971	1,064
1931	19,040	6,323	5,546	5,651	2,851	2,336	1,701	99	2,191	1,802	1,454	1,167
Peaches:												
1930	3,872	1,593	992	807	747	735	509	657	538	383	678	560
1931	5,530	2,901	1,220	1,474	1,632	950	455	669	878	312	837	444
Pears:												
1930	6,119	2,138	1,520	830	607	876	299	886	456	427	256	455
1931	5,557	1,364	928	707	371	433	149	491	299	242	127	456
Plums and prunes, fresh:												
1930	1,772	626	376	284	229	187	185	54	186	115	114	49
1931	1,674	435	303	226	145	100	54	42	115	60	79	19
Potatoes:												
1930	23,117	16,298	8,871	8,589	8,047	4,610	4,851	6,509	3,921	3,150	3,439	3,613
1931	20,368	16,408	7,537	7,898	6,573	3,999	4,647	6,429	3,900	3,057	3,178	3,651
Strawberries:												
1930	1,365	1,151	380	711	511	303	146	75	316	142	304	23
1931	1,869	1,371	439	853	677	389	289	89	411	182	484	9
Sweetpotatoes:												
1930	1,570	1,636	320	793	702	962	279	305	562	851	558	163
1931	1,121	1,639	286	879	779	904	164	205	660	581	535	36
Tomatoes:												
1930	8,153	2,965	2,225	1,927	1,354	1,575	583	566	349	1,055	504	648
1931	6,674	2,585	1,860	1,787	1,146	1,332	689	417	265	915	450	330
Watermelons:												
1930	3,652	2,823	2,035	724	1,539	1,112	1,568	2,141	1,070	985	1,438	382
1931	3,632	2,806	1,643	692	1,354	852	1,728	1,966	1,079	1,397	1,502	406
Total: [2]												
1924	122,744	56,079	35,874	32,937	13,589	21,124	14,384	14,976	16,082	12,843	12,278	11,516
1925	125,609	57,782	35,229	30,119	17,980	20,416	15,181	15,164	15,541	11,977	11,785	13,095
1926	128,667	59,349	35,383	30,513	20,553	21,075	16,278	16,244	16,380	12,672	11,976	14,121
1927	139,463	64,617	35,970	35,588	22,679	21,434	16,523	16,012	16,825	12,534	12,213	14,648
1928	140,142	65,405	34,905	38,773	23,872	21,688	15,599	17,135	16,430	12,397	12,424	14,202
1929	141,634	64,141	38,180	37,582	27,918	26,010	17,452	17,817	17,913	13,309	13,019	12,965
1930	137,686	61,982	41,590	34,360	26,287	25,450	17,884	18,039	16,651	15,356	14,126	13,387
1931	133,663	61,325	39,442	35,369	25,547	22,148	17,077	16,616	16,442	14,739	13,757	12,058

Bureau of Agricultural Economics. Compiled from daily reports made by common carriers to bureau representatives in the various markets. Unloads as shown in car lots include those by boat and less than car lots reduced to car-lot basis. This table not comparable with table published in former Yearbooks.

[1] Includes honeydews and other miscellaneous melons.

[2] Totals include: 1924–1926, 16 commodities, beginning 1927, 18 commodities.

TABLE 260.—*Fruits and vegetables: Unloads of truck receipts of specified commodities in 7 markets, in car-lot equivalents, 1930 and 1931*

Commodity and year	Boston	Denver	Los Angeles	New York	Philadelphia	Salt Lake City	San Francisco
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
Apples:							
1930	1,616	30	199	2,793	1,397	127	59
1931	1,568	17	266	2,300	1,853	124	373
Beans, snap:							
1930	672	64	1,275	2,004	913	44	15
1931	----------	45	----------	1,675	1,036	50	253
Cabbage:							
1930	530	98	1,193	1,927	593	76	27
1931	509	97	1,099	1,771	691	76	322
Cantaloupes:[1]							
1930	0	116	2,163	403	794	146	142
1931	2	178	2,331	829	1,173	204	496
Carrots:							
1930	697	163	2,126	1,092	310	127	30
1931	----------	59	----------	965	474	136	352
Celery:							
1930	374	187	2,764	2,553	195	100	143
1931	388	160	2,469	742	265	94	399
Corn, green:							
1930	687	187	1,014	2,870	1,554	80	184
1931	----------	190	----------	2,901	2,020	74	341
Cucumbers:							
1930	364	64	424	555	243	40	4
1931	----------	53	----------	775	404	61	72
Grapes:							
1930	18	0	2,079	207	125	15	83
1931	35	0	1,455	205	222	26	325
Lettuce:[2]							
1930	1,057	199	3,000	2,241	140	117	188
1931	1,054	206	3,415	1,214	434	110	1,301
Onions:							
1930	69	125	669	1,748	135	80	4
1931	83	62	565	1,519	212	85	49
Peaches:							
1930	39	0	1,145	660	608	74	0
1931	----------	0	1,446	1,833	1,824	126	354
Pears:							
1930	51	0	420	334	41	43	9
1931	50	0	504	222	45	18	133
Peppers:							
1930	237	66	415	1,187	464	31	20
1931	----------	52	----------	1,152	541	32	130
Plums and prunes:							
1930	0	6	284	4	0	22	0
1931	0	0	267	5	2	24	71
Potatoes:							
1930	136	392	1,594	3,286	1,738	515	1
1931	99	499	1,870	4,579	3,571	574	269
Spinach:							
1930	993	77	1,146	2,042	436	67	59
1931	999	62	1,143	1,726	1,005	54	434
Strawberries:							
1930	173	43	823	676	0	62	301
1931	160	46	628	609	1,083	68	286
Sweet potatoes:							
1930	0	0	450	1,148	860	0	33
1931	0	0	625	1,647	1,899	1	149
Tomatoes:							
1930	581	153	2,710	2,266	1,702	153	252
1931	376	109	2,755	1,917	1,474	225	667
Watermelons:							
1930	0	35	616	20	118	45	0
1931	0	17	763	20	328	66	23

Bureau of Agricultural Economics. Compiled from reports made by bureau representatives in the various markets. Data for some markets are incomplete. They are reported as follows: *Denver.*—Receipts for 1930 are estimated about 90 per cent of the total truck receipts of these commodities. *Philadelphia.*—For 1930, truck reports are available for July-December only. They are estimated to represent about 90 per cent of the truck receipts during those months. *San Francisco.*—For 1930, reports on cantaloupes, corn, strawberries and tomatoes were secured throughout the year; other commodities mostly for November and December only.

[1] Includes Casabas, Honeydews, Honey Balls, etc.
[2] Includes Romaine.

STATISTICS OF MISCELLANEOUS CROPS

TABLE 261.—*Beans, dry edible:*[1] *Acreage, production, value, exports, etc., United States, 1899, 1909, 1914–1931*

Year	Acreage	Average yield per acre	Production	Price per bushel received by producers Dec. 1[2]	Farm value	Wholesale price at Chicago[3]	Imports, year beginning July 1[4]	Domestic exports, year beginning July 1[4,5]
	1,000 acres	*Bushels of 60 pounds*	*1,000 bushels*	*Dollars*	*1,000 dollars*	*Dollars*	*1,000 bushels*	*1,000 bushels*
1899	*454*	*11.2*	*5,064*	----------	----------	1.23	(6)	----------
1909	*803*	*14.0*	*11,251*	----------	----------	2.27	1,015	----------
1914	875	13.2	11,585	2.26	26,213	1.33	906	----------
1915	928	11.1	10,321	2.59	26,771	1.91	663	----------
1916	1,107	9.7	10,715	5.10	54,686	2.54	3,748	----------
1917	1,821	8.8	16,045	6.50	104,350	5.45	4,146	1,517
1918	1,744	10.0	17,397	5.28	91,863	6.89	4,016	4,489
1919	*1,162*	*12.1*	*14,079*	----------	----------	----------	----------	----------
1919	1,065	12.6	13,399	4.26	57,046	4.75	3,806	1,993
1920	852	10.8	9,225	2.96	27,282	4.06	824	1,216
1921	782	11.7	9,185	2.67	24,515	2.77	520	1,100
1922	1,086	11.9	12,877	3.74	48,133	4.48	2,623	692
1923	1,344	12.1	16,308	3.67	59,782	4.22	886	675
1924	*1,637*	----------	----------	----------	----------	----------	----------	----------
1924	1,576	9.6	15,164	3.74	56,744	3.28	1,421	549
1925	1,606	12.4	19,928	3.28	65,376	3.70	1,271	576
1926	1,677	10.6	17,707	2.93	51,876	2.97	1,051	529
1927	1,571	10.3	16,181	2.88	46,612	[7] 3.31	2,465	427
1928	1,641	10.8	17,647	4.18	73,782	5.40	1,505	316
1929	1,836	11.2	20,514	[8] 6.27	76,765	5.86	2,534	296
1930	2,091	11.0	23,063	[8] 3.90	53,719	3.98	1,346	271
1931[9]	1,860	11.5	21,298	[8] 2.46	31,199	2.72	----------	----------

Bureau of Agricultural Economics. Italic figures are census returns; census figures include all States; other figures, estimates of crop-reporting board, principal producing States only.

[1] Table includes, besides the ordinary edible beans and limas, the blackeye of California which is identical with the blackeyed pea of the South. Soybeans not included.
[2] Farm prices are as of Nov. 15, 1914–1924.
[3] Prices 1899 and 1909 from Chicago Board of Trade annual reports, quotations for navy, good to choice; 1914–1929 from Daily Trade Bulletin, pea beans (quoted per 100 pounds; converted to bushels of 60 pounds).
[4] Imports and exports compiled from Commerce and Navigation of the United States, 1910–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1926; January and June issues, 1927–1931; and official records of the Bureau of Foreign and Domestic Commerce.
[5] Not separately reported prior to 1918.
[6] Not separately reported.
[7] 11 months.
[8] Dollars per bag of 100 pounds.
[9] Preliminary.

TABLE 262.—*Beans, dry edible:*[1] *Acreage, production, and December 1 price, by States, 1928–1931*

State	Acreage 1928	Acreage 1929	Acreage 1930	Acreage 1931[2]	Average yield per acre 1928	Average yield per acre 1929	Average yield per acre 1930	Average yield per acre 1931	Production 1928	Production 1929	Production 1930	Production 1931[2]	Price per bag of 100 pounds received by producers Dec. 1 1928[3]	Price 1929	Price 1930	Price 1931
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Bus.*	*Bus.*	*Bus.*	*Bus.*	*1,000 bus.*	*1,000 bus.*	*1,000 bus.*	*1,000 bus.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Me.	6	8	9	10	15.0	12.0	12.5	12.5	90	96	112	125	5.10	8.50	7.30	4.70
Vt.	5	3	3	4	14.0	9.5	10.0	10.0	70	28	30	40	5.15	7.10	5.50	4.50
N. Y.	80	103	124	120	14.5	12.0	9.3	18.0	1,160	1,236	1,153	2,160	4.70	7.45	5.55	3.00
Mich.	538	575	690	614	11.0	9.1	6.1	9.0	5,918	5,232	4,209	5,526	4.45	6.20	4.30	2.10
Wis.	6	8	9	7	9.0	7.0	6.7	4.0	54	56	60	28	3.90	6.00	5.65	3.20
Minn.	5	5	6	7	9.0	6.0	6.0	6.5	45	30	36	46	4.00	7.20	5.95	3.35
Nebr.	9	9	10	14	9.7	7.5	9.5	6.5	87	68	95	91	3.50	6.20	5.20	2.80
Kans.	6	22	13	9	6.0	5.0	12.0	5.5	36	110	156	50	3.75	6.15	5.20	2.90
Mont.	40	47	49	37	14.5	16.0	18.0	16.0	580	752	882	592	3.85	6.00	4.10	1.60
Idaho	86	134	168	178	19.0	20.0	19.0	19.5	1,634	2,680	3,192	3,471	3.60	4.55	3.00	1.45
Wyo.	24	31	37	36	15.0	16.0	20.0	17.0	360	496	740	612	3.40	5.15	4.00	1.75
Colo.	309	372	432	320	4.5	6.0	10.0	4.3	1,390	2,232	4,320	1,376	3.40	4.50	2.25	1.80
N. Mex.	214	167	169	161	4.0	9.9	4.5	7.5	856	1,653	760	1,208	3.15	4.35	2.50	2.10
Ariz.	6	6	8	8	7.0	8.0	8.5	7.0	42	48	68	56	3.70	5.25	3.50	2.85
Oreg.	-----	7	1	1	-----	4.1	12.0	12.0	------	29	12	12	------	8.30	5.75	4.00
Calif.	307	339	363	334	17.3	17.0	19.9	17.7	5,325	5,768	7,238	5,905	4.40	8.25	4.80	3.50
U. S.	1,641	1,836	2,091	1,860	10.8	11.2	11.0	11.5	17,647	20,514	23,063	21,298	4.18	6.27	3.90	2.46

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Table includes, besides the ordinary edible beans and limas, the blackeye of California which is identical with the blackeyed pea of the South. Soybeans not included.
[2] Preliminary.
[3] Price per bushel of 60 pounds.

TABLE 263.—*Beans, dry edible:*[1] *Production by varieties, 100-pound bags, United States, 1927–1931*

Year	Small white and pea beans	Large white	Great Northern	Yellow eye	White kidney	Red kidney	Cranberry	Red Mexican	Pinto	Pinks	Limas [2]	Other	Total [3]
	1,000 bags	*1,000 bags*	*1,000 bags*	*1,000 bags*	*1,000 bags*	*1,000 bags*	*1,000 bags*	*1,000 bags*	*1,000 bags*	*1,000 bags*	*1,000 bags*	*1,000 bags*	*1,000 bags*
1927 [4]	3,040	219	1,349	117	54	488	113	191	1,530	586	1,361	345	9,703
1928 [4]	3,730	236	1,229	114	33	680	106	297	1,372	589	1,355	419	10,588
1929	3,721	210	1,744	104	42	418	107	395	2,305	644	1,473	562	12,240
1930	3,309	224	2,066	77	38	334	123	541	3,024	666	1,798	672	13,759
1931 [5]	4,148	338	2,006	140	117	586	127	518	1,499	567	1,727	470	12,705

Bureau of Agricultural Economics. Based upon reports by growers on proportion of total production made up of each variety, supplemented by investigations of field statisticians.

[1] Table includes, besides the ordinary edible beans and Limas, the blackeye of California, which is identical with the blackeyed "pea" of the South. Soybeans not included.
[2] Figures for all Limas include the following: Standard Limas, 1927, 1,036,000 bags; 1928, 954,000 bags; 1929, 987,000 bags; 1930, 1,102,000 bags; 1931, 1,064,000 bags; Baby Limas, 1927, 325,000 bags; 1928, 401,000 bags; 1929, 486,000 bags; 1930, 696,000 bags; 1931, 663,000 bags.
[3] Totals include blackeyes as follows: 1927, 310,000 bags; 1928, 428,000 bags; 1929, 515,000 bags; 1930, 887,000 bags; 1931, 462,000 bags.
[4] Computed from bushels of 60 pounds.
[5] Preliminary.

TABLE 264.—*Beans, dry edible: Production*[1] *in specified countries, bags of 100 pounds, 1925–26 to 1931–32*

Country	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31	1931–32 [2]
	1,000 bags	*1,000 bags*	*1,000 bags*	*1,000 bags*	*1,000 bags*	*1,000 bags*	*1,000 bags*
Canada	900	696	622	702	895	863	761
United States	11,902	10,542	9,640	10,524	12,240	13,759	12,705
Mexico	4,326	4,711	4,307	3,883	2,094	1,774	----------
England and Wales	3,307	3,546	3,655	2,923	2,462	3,118	2,691
Scotland	67	65	67	67	60	76	----------
Netherlands	403	361	233	230	336	----------	----------
France	3,436	2,100	2,707	1,535	2,249	2,581	2,598
Italy	3,148	3,534	2,441	1,785	3,468	3,490	2,271
Spain	3,728	2,766	3,877	2,578	3,438	3,631	----------
Germany	----------	----------	400	253	272	255	240
Czechoslovakia	312	311	295	215	247	214	----------
Austria	231	172	215	208	272	276	----------
Hungary	1,086	1,358	1,054	605	1,023	1,017	[3] 700
Yugoslavia	2,016	2,612	1,573	697	2,068	3,352	[3] 1,500
Rumania	5,462	5,542	3,784	2,652	5,711	4,476	6,866
Bulgaria	1,303	992	638	386	1,121	1,724	[3] 2,200
Greece	174	205	106	104	109	128	----------
Japan	1,766	1,339	1,637	1,499	[4] 2,156	[4] 2,926	[4] 1,494
Chosen	122	137	99	83	89	103	----------
Brazil	11,219	11,729	13,455	15,321	----------	----------	----------
Chile	970	1,126	1,725	1,660	1,691	1,489	----------
Madagascar [5]	463	305	281	264	380	[3] 233	[3] 308
Total countries reporting all periods	34,789	32,566	28,032	23,572	33,773	37,539	34,094
Total all countries	----------	----------	52,811	48,174	----------	----------	----------

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture except as otherwise stated. Figures are for the harvesting seasons 1925 to 1931 in the Northern Hemisphere and 1925–26 to 1931–32 in the Southern Hemisphere.

[1] Excluding soy, mung, adzuki, broad, and horse beans and similar classes not commonly used as edible beans in the United States.
[2] Preliminary.
[3] Unofficial estimate.
[4] Production in Hokkaido Province, where most of the dry edible bean varieties are grown.
[5] Lima beans.

TABLE 265.—*Beans, dry, edible: Car-lot shipments, by State of origin, 1920–21 to 1930–31*

State	Crop-movement season [1]										
	1920–21	1921–22	1922–23	1923–24	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31 [2]
	Cars	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*	*Cars*
New York	935	1,555	1,650	1,969	1,900	1,158	916	614	889	1,056	961
Michigan	5,095	4,784	5,477	8,333	7,848	10,506	8,699	4,989	6,383	5,616	5,046
Montana	29	12	44	104	124	288	280	386	566	733	647
Idaho	139	141	351	749	1,336	1,898	1,437	2,074	1,973	2,516	2,671
Wyoming	-------	1	-------	9	31	82	130	252	347	577	785
Colorado	333	486	427	1,732	1,316	2,927	1,866	1,711	1,732	2,347	4,312
New Mexico	740	839	75	146	388	170	412	608	555	1,750	624
California	3,148	3,403	3,774	2,951	1,847	2,558	3,433	3,251	2,961	3,588	2,850
Other States	80	83	46	100	134	138	114	55	122	239	357
Total	10,499	11,304	11,844	16,093	14,924	19,725	17,287	13,940	15,528	18,422	18,253

Bureau of Agricultural Economics. Compiled from monthly reports received by the bureau from local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

[1] Crop-movement season extends from September of one year through August of the following year.
[2] Preliminary.

TABLE 266.—*Beans, dry, edible: Wholesale price per 100 pounds. 1922–23 to 1931–32*

PEA (NEW YORK AND MICHIGAN HAND PICKED), BOSTON [1]

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	7.06	6.97	7.68	7.81	7.62	7.71	7.66	7.60	7.27	7.35	7.18	6.89	7.40
1923–24	7.40	7.75	7.79	7.12	7.06	7.40	7.30	7.28	7.12	7.12	7.16	7.68	7.35
1924–25	8.04	8.18	8.10	8.00	6.94	7.20	6.91	6.60	6.31	6.34	6.17	5.89	7.06
1925–26	5.50	5.49	5.86	5.90	5.67	5.49	5.32	5.06	5.01	5.48	5.65	5.48	5.49
1926–27	5.28	5.98	6.32	6.11	5.86	5.66	5.38	5.28	5.46	6.29	6.48	6.62	5.89
1927–28	6.34	6.18	6.12	6.16	6.69	7.88	8.71	9.81	10.08	10.18	10.30	10.22	8.22
1928–29	9.94	9.75	9.55	9.50	9.95	10.97	11.13	10.41	10.45	10.38	9.97	10.32	10.19
1929–30	10.56	10.12	8.66	8.09	8.12	8.00	7.62	7.12	7.22	7.31	7.02	7.81	8.14
1930–31	8.25	7.12	6.38	6.32	6.19	5.75	5.66	5.55	5.25	5.06	4.98	4.91	5.95
1931–32	4.62	4.25	4.19	3.62	------	------	------	------	------	------	------	------	------

SMALL WHITE, SAN FRANCISCO [2]

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average
1922–23	5.40	5.59	6.11	6.48	7.48	7.23	7.27	7.22	6.76	6.81	6.42	6.05	6.57
1923–24	6.75	6.05	6.09	5.92	5.92	6.18	6.03	6.02	6.04	6.29	7.04	7.29	6.33
1924–25	7.86	8.00	7.89	7.18	7.22	7.71	7.54	7.49	7.38	7.31	7.42	7.42	7.54
1925–26	7.32	6.20	5.71	5.98	6.26	6.25	5.97	5.87	5.62	5.57	5.83	5.95	6.04
1926–27	5.66	5.89	5.94	5.81	5.83	5.85	5.86	6.34	7.17	8.26	8.57	8.58	6.65
1927–28	7.75	5.60	5.88	5.80	6.21	6.66	8.42	9.20	9.28	9.03	8.75	8.36	7.58
1928–29	7.15	8.11	8.40	8.52	9.23	9.99	9.90	9.59	9.45	9.45	10.59	------	------
1929–30	------	8.67	8.55	8.06	7.38	7.83	8.12	7.87	7.83	7.64	7.43	6.99	------
1930–31	7.02	6.09	5.20	4.86	4.56	4.51	4.28	4.24	4.27	4.02	3.67	3.73	4.70
1931–32	3.56	2.98	3.38	3.12	------	------	------	------	------	------	------	------	------

LIMA, CALIFORNIA, NEW YORK [1]

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average
1922–23	8.91	8.49	8.65	8.91	9.39	9.79	9.59	9.41	8.59	8.80	8.25	8.55	8.94
1923–24	9.40	9.84	10.41	10.09	10.81	11.30	12.40	12.68	12.48	12.59	12.62	13.04	11.47
1924–25	13.62	14.42	14.12	13.89	14.41	15.00	14.79	14.85	14.94	15.27	15.79	16.27	14.78
1925–26	15.92	14.11	13.24	11.88	11.83	12.06	11.20	10.13	9.15	8.88	8.76	8.55	11.31
1926–27	8.94	8.44	7.68	7.01	7.14	6.94	6.97	6.97	6.86	6.74	6.68	6.67	7.25
1927–28	6.96	6.97	6.85	6.83	7.00	7.87	8.33	9.06	9.69	9.75	9.90	10.17	8.28
1928–29	9.90	9.76	10.56	12.01	12.61	13.42	13.50	13.50	14.40	15.25	15.90	16.17	13.08
1929–30	16.76	14.39	13.27	12.95	12.28	12.07	12.71	12.71	12.67	12.45	12.01	11.95	13.02
1930–31	12.05	9.90	8.74	7.37	7.58	7.94	7.56	7.50	7.40	6.55	5.98	6.29	7.90
1931–32	6.08	5.78	5.88	5.50	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from the Boston Produce Market Report, weekly; San Francisco Commercial News, daily; and New York Producers Price Current, daily. See 1930 Yearbook, pp. 794–795 for data for earlier years.

[1] Prices represent prevailing values of the commodity and grade specified, as indicated by sales from receivers to wholesale distributors.
[2] Quotations for shipment f. o. b. rail California.

TABLE 267.—*Soybeans: Acreage, production, and value, by States, 1930 and 1931*

State	Beans gathered						Total, except hay						Farm price Dec. 1 of beans gathered		Value of total production except hay [4]	
	Acreage [1]		Yield per acre		Total yield		Total acreage [2]		Yield per acre [3]		Total production [3]					
	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931
	1,000 acres	*1,000 acres*	*Bus.*	*Bus.*	*1,000 bus.*	*1,000 bus.*	*1,000 acres*	*1,000 acres*	*Bus.*	*Bus.*	*1,000 bus.*	*1,000 bus.*	*Dolls. p. bu.*	*Dolls. p. bu.*	*1,000 dolls.*	*1,000 dolls.*
Ohio	21	28	14.0	20.0	294	560	21	28	14.0	20.0	294	560	1.60	0.35	470	196
Ind	129	172	14.0	17.8	1,806	3,062	129	172	14.0	17.8	1,806	3,062	1.20	.35	2,167	1,072
Ill	336	346	17.0	17.5	5,712	6,055	336	346	17.0	17.5	5,712	6,055	1.20	.35	6,854	2,119
Mich	2	2	10.0	12.0	20	24	2	2	10.0	12.0	20	24	2.00	.25	40	6
Wis	2	2	11.5	10.0	23	20	2	2	11.5	10.0	23	20	2.50	.90	58	18
Iowa	52	34	16.5	17.0	858	578	52	34	16.5	17.0	858	578	1.35	.60	1,158	347
Mo	78	90	9.5	12.0	741	1,080	78	90	9.5	12.0	741	1,080	1.65	.60	1,223	648
Kans	8	12	7.5	9.0	60	108	8	12	7.5	9.0	60	108	1.60	1.00	96	108
Del	26	26	6.0	14.0	156	364	26	26	6.0	14.0	156	364	2.45	.60	382	218
Md	5	7	6.5	13.5	32	94	5	7	6.5	13.5	32	94	2.25	.90	72	85
Va	18	20	7.5	14.0	135	280	26	28	7.5	14.0	195	392	2.40	.80	468	314
W. Va	1	1	7.0	12.0	7	12	3	3	7.0	12.0	21	36	2.90	2.15	61	77
N. C	97	107	13.0	14.0	1,261	1,498	237	253	13.0	14.0	3,081	3,542	1.55	.70	4,776	2,479
S. C	8	10	10.5	9.5	84	95	28	34	10.5	9.5	294	323	2.05	1.20	603	388
Ga	11	15	10.0	9.5	110	142	14	18	10.0	9.5	140	171	3.00	1.80	420	308
Ky	6	7	10.0	13.5	60	94	26	28	10.0	13.5	260	378	2.35	.85	611	321
Tenn	18	22	8.0	7.5	144	165	18	22	8.0	7.5	144	165	2.10	.95	302	157
Ala	7	10	12.0	11.5	84	115	13	18	12.0	11.5	156	207	2.10	1.50	328	310
Miss	6	15	10.0	15.0	60	225	12	26	10.0	15.0	120	390	2.30	1.45	276	566
Ark	5	8	10.5	14.5	52	116	10	12	10.5	14.5	105	174	2.40	1.10	252	191
La	21	16	10.5	10.6	220	170	108	103	10.5	10.6	1,134	1,092	2.85	1.75	3,232	1,911
Okla	7	6	8.0	10.0	56	60	8	7	8.0	10.0	64	70	2.30	1.15	147	80
U. S	864	956	13.9	15.6	11,975	14,917	1,162	1,271	13.3	14.9	15,416	18,885	1.56	.63	23,996	11,919

Bureau of Agricultural Economies. Estimates of the crop-reporting board.

[1] Acres from which all or part of the beans grown were gathered.
[2] Including acres planted in corn reduced to equivalent solid acres as well as the acreage grown alone.
[3] Including beans grazed or otherwise utilized as well as those gathered.
[4] Total production (except hay) multiplied by price of gathered beans to give approximate total value

TABLE 268.—*Soybeans: Production in specified countries, 1920–21 to 1931–32*

Crop year	United States	Manchuria [1]	Chosen	Japan	Dutch East Indies
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1921–22	2,815	65,000	23,953	21,200	3,631
1922–23	[2] 4,329	109,067	23,117	18,624	3,858
1923–24	[2] 6,541	88,867	23,760	17,578	3,574
1924–25	[2] 5,680	92,667	18,723	13,758	3,536
1925–26	[2] 5,102	116,667	23,609	18,473	3,933
1926–27	[2] 6,517	135,000	22,276	12,512	3,672
1927–28	[2] 7,459	163,319	24,300	16,704	3,971
1928–29	8,688	177,804	19,507	15,239	4,298
1929–30	8,670	178,389	20,430	13,592	3,917
1930–31	11,975	193,564	22,691	----------	4,468
1931–32	14,917	[3] 211,642	----------	----------	----------

Bureau of Agricultural Economics. Compiled from official sources.

[1] Manchuria produces about 97 per cent of the bean production of China. Production figures for China are not available.
[2] Subject to revision.
[3] Preliminary.

TABLE 269.—*Soybeans and soybean oil: International trade, average 1925–1929, annual 1928–1930*

SOYBEANS

Country	Calendar year							
	Average, 1925–1929		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
China [2]	3,731,214	0	4,780,513	0	5,468,725	0	3,810,478	0
PRINCIPAL IMPORTING COUNTRIES								
Germany	0	1,390,622	0	1,868,891	0	2,257,198	0	1,959,417
Japan	5,574	1,015,825	5,714	1,040,128	5,738	1,261,690	4,938	953,772
Denmark	0	394,965	0	472,469	0	518,753	0	388,593
United Kingdom	0	305,643	0	429,014	0	454,689	0	204,532
Sweden	0	166,799	0	199,528	0	221,231	2	108,317
Italy	[3] 42	97,395	9	141,478	110	194,652	10	17,733
Netherlands	1,192	58,510	463	40,180	487	108,304	328	42,398
United States [4]	0	4,064	0	4,256	0	4,337	0	3,852
Total	6,808	3,433,823	6,186	4,195,944	6,335	5,020,854	5,278	3,678,614

SOYBEAN OIL

Country	Average, 1925–1929 Exports	Average, 1925–1929 Imports	1928 Exports	1928 Imports	1929 Exports	1929 Imports	1930 [1] Exports	1930 [1] Imports
PRINCIPAL EXPORTING COUNTRIES								
China	244,894	0	125,625	0	148,673	0	251,909	0
Germany	45,828	30,004	73,140	2,466	103,862	4,376	49,520	28,833
Denmark	36,742	3,670	46,466	1,267	43,690	699	28,609	2,084
Japan	14,393	323	10,870	[5] 842	14,739	[5] 500	34,157	[5] 214
Sweden	12,917	10,182	16,796	10,019	15,911	10,434	4,916	13,254
Total	354,774	44,180	272,897	14,594	326,875	16,009	369,111	44,385
PRINCIPAL IMPORTING COUNTRIES								
Netherlands	40,024	109,176	35,509	91,249	23,888	93,739	22,999	124,768
United Kingdom	49,942	75,917	48,919	55,196	40,347	33,038	35,058	56,529
United States	4,528	19,545	7,142	13,116	7,967	19,489	4,962	8,348
France	159	17,401	213	19,064	375	17,163	6	25,965
Morocco	0	[6] 9,855	0	9,381	0	10,657	0	5,439
Algeria	19	6,394	[5] 43	3,542	[5] 23	133	[5] 22	11
Austria	17	6,011	35	8,350	45	9,887	0	5,894
Total	94,689	244,299	91,861	199,898	72,645	184,106	63,047	226,945

Bureau of Agricultural Economics. Official sources except where otherwise noted.

[1] Preliminary.
[2] These figures are for yellow beans, including mostly soybeans, according to Agricultural Commissioner Paul O. Nyhus.
[3] 3-year average.
[4] Imports for consumption.
[5] International Yearbook of Agricultural Statistics.
[6] 4-year average.

TABLE 270.—*Soybeans: Estimated average price per bushel, received by producers, United States, 1922–23 to 1931–32*

Season beginning October—	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Weighted average
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1922–23	1.89	2.06	1.97	2.07	2.13	2.00
1923–24	2.09	2.11	2.11	2.23	2.26	2.12
1924–25	2.23	2.16	2.36	2.59	2.64	2.29
1925–26	2.27	2.18	2.17	2.38	2.33	2.23
1926–27	1.97	1.85	1.83	1.90	2.03	1.89
1927–28	1.86	1.70	1.61	1.70	1.69	1.72
1928–29	1.72	1.69	1.70	1.82	1.93	1.72
1929–30	1.79	1.70	1.72	1.85	1.91	1.75
1930–31	1.64	1.48	1.44	1.46	1.40	1.50
1931–32	.58	.52	.61			

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by estimated monthly marketings. For previous data see 1930 or earlier Yearbooks.

TABLE 271.—*Soybeans for seed: Average wholesale selling price per bushel at Baltimore and St. Louis, 1922–1931*

Year	Baltimore						St. Louis					
	Jan.	Feb.	Mar.	Apr.	May	Average	Jan.	Feb.	Mar.	Apr.	May	Average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922	1.90	2.10	2.10	2.10	2.00	2.04	2.40	2.40	2.50	2.30	2.75	2.47
1923	2.40	2.40	2.40	2.30	2.25	2.35	3.00	2.85	2.70	2.70	2.95	2.84
1924	2.10	2.40	2.40	2.70	3.00	2.52	2.80	2.80	2.80	2.80	2.75	2.79
1925	2.85	2.95	3.15	2.95	2.35	2.85	2.40	2.40	2.40	2.25	2.10	2.31
1926	2.00	2.05	2.10	2.15	2.75	2.21	2.15	2.15	2.30	2.55	2.90	2.41
1927	1.80	1.80	1.80	1.80	1.85	1.81	2.70	2.70	2.40	2.50	2.70	2.60
1928	1.95	1.90	1.95	1.95	2.15	1.98	1.80	1.80	1.85	2.00	2.25	1.94
1929	2.25	2.35	2.40	2.40	2.70	2.42	2.55	2.55	2.60	2.75	2.85	2.66
1930	2.10	2.10	2.10	2.25	2.65	2.24	2.15	2.25	2.25	2.25	2.25	2.23
1931	2.25	2.25	2.25	2.25	2.25	2.25	1.80	1.80	1.80	1.80	1.95	1.83

Bureau of Agricultural Economics. Compiled from weekly reports to the bureau from seedsmen in the various markets. These prices are the average wholesale selling prices for high-quality seed.

TABLE 272.—*Soybean oil: Quantity of beans crushed and quantity of crude oil produced, 1922–23 to 1930–31*

Year beginning October	Soybeans crushed					Oil produced				
	Oct.–Dec.	Jan.–Mar.	Apr.–June	July–Sept.	Total	Oct.–Dec.	Jan.–Mar.	Apr.–June	July–Sept.	Total
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
1922–23	2,708	3,876	2,350	594	9,528	364	768	272	78	1,482
1923–24	2,230	3,232	564	102	6,128	286	388	72	13	759
1924–25	3,550	7,478	3,038	4,336	18,402	477	870	360	562	2,269
1925–26	5,486	7,746	7,450	358	21,040	728	990	874	46	2,638
1926–27	5,132	6,804	6,032	2,104	20,072	735	862	776	286	2,659
1927–28	8,788	10,278	8,792	5,654	33,512	1,164	1,289	1,132	789	4,374
1928–29	11,480	21,190	9,666	10,560	52,896	1,506	3,046	1,277	1,456	7,285
1929–30	39,658	25,288	20,716	14,324	99,986	5,231	3,343	2,905	1,945	13,424
1930–31	43,546	64,630	77,346	58,432	243,954	6,194	9,086	10,996	8,391	34,667

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census, "Animal and vegetable fats and oils."

TABLE 273.—*Soybean oil, crude, in barrels: Wholesale price per pound, Saturday nearest the 15th of the month, New York, 1922–1931*

Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922	8.88	9.12	10.88	11.38	-------	-------	-------	-------	-------	10.00	10.38	10.88
1923	11.19	11.69	12.62	13.12	13.12	12.62	11.88	11.62	11.62	10.88	11.00	11.38
1924	11.62	12.50	12.50	11.75	12.38	12.00	12.38	12.50	12.75	12.25	13.12	13.38
1925	13.25	13.25	13.25	13.38	13.38	13.38	13.38	13.38	13.38	13.38	13.38	13.38
1926	13.38	13.38	13.38	13.38	13.38	13.50	14.00	14.00	14.00	14.00	13.00	12.00
1927	12.00	12.12	12.12	12.12	12.38	12.12	12.12	12.12	12.12	12.12	12.12	12.12
1928	12.12	12.12	12.12	12.12	12.12	12.38	12.38	12.38	12.38	12.38	12.38	12.38
1929	12.38	12.38	12.38	12.00	11.75	11.75	11.75	11.12	11.12	[1]12.62	12.62	12.25
1930	12.25	12.25	11.38	11.38	11.12	10.88	10.88	10.88	10.88	10.38	10.12	10.12
1931	10.12	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75

Bureau of Agricultural Economics. Compiled from the Oil, Paint, and Drug Reporter. See 1930 Yearbook, p. 798, Table 300, for data for earlier years.

[1] Beginning October, 1929, reported as imported.

TABLE 274.—*Cowpeas: Acreage, production, and value, by States, 1930 and 1931*

State	Peas gathered						Total, except hay						Farm price Dec. 1 of peas gathered		Value of total production except hay[4]	
	Acres from which gathered[1]		Peas gathered per acre		Total quantity gathered		Total acres[2]		Yield per acre[3]		Total production[3]					
	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931
	1,000 acres	*1,000 acres*	*Bus.*	*Bus.*	*1,000 bus.*	*1,000 bus.*	*1,000 acres*	*1,000 acres*	*Bus.*	*Bus.*	*1,000 bus.*	*1,000 bus.*	*Dolls. p. bus.*	*Dolls. p. bus.*	*1,000 dolls.*	*1,000 dolls.*
Ind.	5	6	8.5	10.5	42	63	5	6	8.5	10.5	42	63	1.90	0.70	80	44
Ill.	41	59	6.5	10.0	266	590	41	59	6.5	10.0	266	590	1.75	.65	466	384
Mo.	16	18	8.0	11.5	128	207	16	18	8.0	11.5	128	207	2.20	.95	282	197
Kans.	1	1	5.5	6.0	6	6	1	1	5.5	6.0	6	6	1.70	1.75	10	10
Del.	1	2	6.0	11.0	6	22	1	2	6.0	11.0	6	22	2.40	1.00	14	22
Md.	1	1	5.0	10.0	5	10	1	1	5.0	10.0	5	10	2.35	1.20	12	12
Va.	6	7	6.0	11.0	36	77	10	13	6.0	11.0	60	143	2.90	1.00	174	143
N. C.	17	34	11.0	12.0	187	408	45	82	11.0	12.0	495	984	2.10	.80	1,040	787
S. C.	78	109	8.5	8.5	663	926	107	153	8.5	8.5	910	1,300	1.80	.65	1,638	845
Ga.	47	80	9.0	9.5	423	760	75	136	9.0	9.5	675	1,292	2.00	.95	1,350	1,227
Fla.	8	8	10.0	9.8	80	78	21	21	10.0	9.8	210	206	2.45	1.25	514	258
Ky.	4	6	8.5	11.5	34	69	8	12	8.5	11.5	68	138	2.20	.90	150	124
Tenn.	26	36	5.0	5.5	130	198	26	36	5.0	5.5	130	198	2.10	.80	273	158
Ala.	53	95	9.0	11.0	477	1,045	55	100	9.0	11.0	495	1,100	1.85	.75	916	825
Miss.	32	54	9.0	10.0	288	540	42	69	9.0	10.0	378	690	2.00	.95	756	656
Ark.	21	37	9.0	13.0	189	481	47	71	9.0	13.0	423	923	2.15	1.10	909	1,015
La.	17	22	10.3	11.0	175	242	35	46	10.3	11.0	360	506	2.60	1.65	936	835
Okla.	13	20	6.0	11.0	78	220	23	35	6.0	11.0	138	385	2.40	1.20	331	462
Tex.	65	90	9.8	11.0	637	990	115	155	9.8	11.0	1,127	1,705	1.90	1.00	2,141	1,705
U. S.	452	685	8.5	10.1	3,850	6,932	674	1,016	8.8	10.3	5,922	10,468	2.02	.93	11,992	9,709

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Acres from which all or part of the peas grown were gathered.
[2] Including acres planted in corn reduced to equivalent solid acres as well as the acreage grown alone. Acreage cut for hay is included in table of legume hay.
[3] Including peas grazed or otherwise utilized as well as those gathered.
[4] Total production (except hay) multiplied by price of gathered peas to give approximate total value.

TABLE 275.—*Cowpeas: Estimated average price per bushel received by producers, United States, 1922–23 to 1931–32*

Crop year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weighted average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	1.66	1.57	1.54	1.64	1.67	1.87	1.98	1.98	2.08	2.08	2.17	2.21	1.73
1923–24	2.08	1.87	1.94	1.95	2.01	2.12	2.21	2.32	2.46	2.53	2.82	2.86	2.14
1924–25	2.56	2.41	2.32	2.34	2.56	2.82	3.16	3.43	3.67	3.70	3.84	3.67	2.73
1925–26	3.24	3.12	2.93	2.98	2.87	3.03	3.21	3.37	3.50	3.43	3.47	3.47	3.09
1926–27	3.22	2.79	2.34	2.05	1.95	1.94	1.94	1.89	1.93	1.90	1.90	1.93	2.21
1927–28	1.84	1.80	1.70	1.72	1.65	1.71	1.74	1.76	1.86	2.00	2.09	2.09	1.80
1928–29	2.01	1.82	1.83	1.83	2.02	2.15	2.45	2.63	2.88	3.05	3.24	3.19	2.18
1929–30	2.99	2.49	2.30	2.22	2.28	2.40	2.59	2.73	2.85	2.93	3.00	2.93	2.48
1930–31	2.66	2.41	2.20	2.05	1.86	1.80	1.75	1.82	1.87	1.93	1.96	1.89	2.10
1931–32	1.63	1.27	.98	.93	.93	------	------	------	------	------	------	------	---------

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by estimated monthly marketings. For previous data see 1930 or earlier Yearbooks.

TABLE 276.—*Cowpeas for seed: Average wholesale selling price per bushel at Baltimore and St. Louis, 1922–1931*

Year	Baltimore						St. Louis					
	January	February	March	April	May	Average	January	February	March	April	May	Average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922	2.20	2.40	2.40	2.40	2.40	2.36	1.90	1.90	2.20	2.25	2.25	2.10
1923	2.55	2.55	2.55	2.55	2.55	2.55	3.00	2.95	2.85	2.85	2.95	2.90
1924	3.00	3.30	3.15	3.40	3.45	3.26	2.75	2.95	3.00	3.05	3.55	3.06
1925	3.90	3.90	3.90	3.90	3.95	3.91	3.90	4.00	4.10	4.10	4.10	4.04
1926	4.25	4.25	4.25	4.25	4.20	4.24	4.50	4.45	4.20	4.10	4.05	4.26
1927	2.25	2.25	2.15	2.10	2.10	2.17	2.40	2.40	2.40	2.40	2.40	2.40
1928	1.80	1.80	2.05	2.20	2.30	2.03	2.40	2.40	2.40	2.50	2.70	2.48
1929	2.85	3.30	3.75	3.75	3.75	3.48	3.50	3.60	3.60	3.70	3.75	3.63
1930	3.30	3.30	3.30	3.30	3.30	3.30	3.15	3.15	3.15	3.10	3.00	3.11
1931	3.00	2.90	2.50	2.50	2.55	2.69	2.40	2.40	2.40	2.40	2.55	2.43

Bureau of Agricultural Economics. Compiled from weekly reports to the bureau from seedsmen in the various markets. These prices are the average wholesale selling prices for high-quality seed.

TABLE 277.—*Velvet beans: Acreage, production, and December 1 price, by States, 1929–1931*

State	Total acres for all purposes			Yield per acre of beans in the hull [1]			Total production of beans in the hull [1]			Price per ton received by producers Dec. 1		
	1929	1930	1931 [2]	1929	1930	1931	1929	1930	1931 [2]	1929	1930	1931
	1,000 acres	*1,000 acres*	*1.000 acres*	*Lbs.*	*Lbs.*	*Lbs.*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*Dolls.*	*Dolls.*	*Dolls.*
South Carolina	67	67	40	1,000	1,100	960	34	37	19	16.00	15.70	10.85
Georgia	649	604	506	880	880	660	286	266	167	13.50	13.50	9.70
Florida	136	122	127	900	650	800	61	40	51	13.50	13.00	9.35
Alabama	296	340	306	780	580	700	115	99	107	14.00	13.50	9.70
Mississippi	38	35	32	1,480	950	1,380	28	17	22	16.00	16.00	11.20
Louisiana	33	33	33	1,150	650	950	19	11	16	16.00	16.00	11.20
United States	1,219	1,201	1,044	890.9	782.7	731.8	543	470	382	13.98	13.78	9.86

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] The figures refer to the yield and entire production of velvet beans in the hull and not merely to those gathered. The pods are gathered from one-fourth to one-third of the acreage and most of these are ground for feed, only enough being shelled to supply seed. A large proportion of the crop is grazed.
[2] Preliminary.

TABLE 278.—*Broomcorn: Acreage, production, and November 15 price, United States, 1915–1931*

Year	Acreage	Average yield per acre	Production	Price per ton received by producers Nov. 15	Year	Acreage	Average yield per acre	Production	Price per ton received by producers Nov. 15
	Acres	*Pounds*	*Short tons*	*Dollars*		*Acres*	*Pounds*	*Short tons*	*Dollars*
1915	230,100	454.1	52,242	91.67	1924	436,000	356.7	77,800	95.81
1916	235,200	329.3	38,726	172.75	1925	214,000	275.7	29,500	[1] 143.02
1917	345,000	332.8	57,400	292.75	1926	306,000	355.6	54,400	[2] 78.77
1918	366,000	340.4	62,300	233.87	1927	237,000	337.6	40,000	[2] 109.50
1919	352,000	303.4	53,400	154.57	1928	298,000	363.1	54,100	[2] 104.21
1920	275,500	265.0	36,500	126.16	1929	310,000	305.2	47,300	[2] 122.83
1921	222,000	344.2	38,200	72.20	1930	391,000	254.7	49,800	[2] 73.61
1922	275,000	271.3	37,300	219.46	1931 [3]	309,000	310.0	47,900	[2] 51.15
1923	536,000	302.8	81,153	160.06					

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Weighted average of the season to Dec. 1. [2] Dec. 1, price. [3] Preliminary.

TABLE 279.—*Broomcorn: Acreage, production, and December 1 price, by States 1928–1931*

State	Acreage				Average yield per acre				Production				Price per ton received by producers Dec. 1			
	1928	1929	1930	1931 [1]	1928	1929	1930	1931	1928	1929	1930	1931 [1]	1928	1929	1930	1931
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Dols.*	*Dols.*	*Dols.*	*Dols.*
Ill.	21	21	28	33	440	502	555	600	4, 600	5, 300	7, 800	9, 900	145	175	110	67
Mo.	4	1	1	1	430	300	220	320	900	200	100	200	90	90	85	60
Kans.	43	50	60	24	450	280	246	298	9, 700	7, 000	7, 400	3, 600	96	115	60	50
Okla.	131	125	164	151	350	287	208	260	22, 900	17, 900	17, 100	19, 600	111	120	82	52
Tex.	9	10	10	11	311	294	285	300	1, 400	1, 500	1, 400	1, 600	107	112	75	41
Colo.	52	64	77	46	360	286	270	250	9, 400	9, 200	10, 400	5, 800	85	112	51	42
N. Mex.	38	39	51	43	272	319	220	335	5, 200	6, 200	5, 600	7, 200	90	115	57	37
U. S.	298	310	391	309	363. 1	305. 2	254. 7	310. 0	54, 100	47, 300	49, 800	47, 900	104. 21	122. 83	73. 61	51. 15

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.

TABLE 280.—*Broomcorn: Supply and distribution, 1924–1931*

	Year beginning June—							
	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31	1931–32
Supply:								
Stocks June 1—	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Manufacturers	15, 169	20, 960	16, 201	18, 173	18, 744	19, 591	14, 980	17, 088
Dealers [1]	15, 489	25, 043	9, 706	11, 498	5, 938	7, 495	6, 667	4, 566
On farms	6, 133	6, 024	3, 265	2, 709	1, 206	823	1, 043	2, 326
Total carry-over	36, 791	52, 027	29, 172	32, 380	25, 888	27, 909	22, 690	23, 980
Production	78, 200	29, 500	54, 400	40, 000	54, 100	47, 300	49, 800	[2] 47, 900
Imports	136	(3)	(3)	193	(3)	(3)	(3)	--------
Total supply available	115, 127	81, 527	83, 572	72, 573	79, 988	75, 209	72, 490	[6] 71, 880
Distribution:								
Exports [4]	5, 580	4, 688	4, 701	4, 591	4, 931	4, 985	4, 557	--------
Domestic use	[5] 57, 520	47, 667	46, 491	41, 894	47, 148	47, 534	43, 953	--------
Stocks on hand May 31	52, 027	29, 172	32, 380	25, 888	27, 909	22, 690	23, 980	--------

Bureau of Agricultural Economics.

[1] Storage stocks reported by dealers include manufacturers' stocks held by dealers at country shipping points.
[2] Dec. 1 estimate.
[3] Less than 100 tons.
[4] For crop year, June 1–May 31.
[5] Includes broomcorn destroyed by warehouse fire.
[6] Not including possible imports.

TABLE 281.—*Hay: Receipts at principal markets, 1924–25 to 1930–31*

Year beginning July	Boston	New York	Pittsburgh	Cincinnati	Chicago	Minneapolis	St. Louis	Kansas City	Omaha	San Francisco
	Short tons	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*
1924–25	46, 188	126, 636	55, 752	95, 760	127, 740	59, 724	81, 240	303, 924	62, 520	53, 448
1925–26	35, 340	97, 080	49, 980	43, 752	117, 372	45, 732	82, 392	318, 000	62, 268	49, 632
1926–27	36, 504	71, 160	65, 172	46, 056	108, 756	59, 100	68, 172	270, 756	75, 936	46, 572
1927–28	32, 400	48, 996	42, 720	71, 052	91, 728	41, 340	53, 592	240, 720	64, 800	37, 200
1928–29	26, 964	37, 236	29, 916	79, 152	95, 016	36, 300	53, 244	247, 296	76, 488	45, 060
1929–30	21, 708	33, 768	26, 232	67, 392	70, 308	33, 072	60, 120	216, 852	65, 820	47, 268
1930–31	16, 356	40, 452	26, 160	69, 012	55, 416	35, 532	51, 876	160, 872	71, 556	52, 224

Bureau of Agricultural Economics. Compiled from weekly reports from the various markets to the Grain, Hay, and Feed Market News Service of the Bureau of Agricultural Economics.

TABLE 282.—*Hay: Acreage, production, December 1 price, exports, etc., United States, 1919–1931*

Year	Tame hay						Wild hay			
	Acreage	Average yield per acre	Production	Price per ton received by producers, Dec. 1	Domestic exports, year beginning July 1 [1]	Imports, year beginning July 1 [1]	Acreage	Yield per acre	Production	Price per ton received by producers, Dec. 1
	1,000 acres	*Short tons*	*1,000 short tons*	*Dollars*	*1,000 short tons*	*1,000 short tons*	*1,000 acres*	*Short tons*	*1,000 short tons*	*Dollars*
1919	*55,653*	*1.34*	*74,724*							
1919	56,020	1.35	75,357	20.19	67	252	17,124	0.93	15,891	16.52
1920	56,781	1.32	75,074	17.75	55	126	16,291	.95	15,533	11.38
1921	57,462	1.21	69,718	12.09	61	5	15,651	.88	13,811	6.57
1922	59,300	1.34	79,650	12.56	53	35	16,181	.90	14,561	7.30
1923	57,741	1.28	74,140	14.13	24	403	15,864	.90	14,312	8.16
1924	*59,073*									
1924	59,066	1.35	79,877	13.79	25	119	15,166	.83	12,601	7.92
1925	54,999	1.22	66,965	13.94	18	431	14,685	.79	11,643	8.55
1926	54,750	1.22	66,916	14.07	15	209	13,337	.68	9,098	10.04
1927	56,754	1.46	83,116	11.29	17	84	14,535	1.03	15,003	6.59
1928	53,287	1.35	71,920	12.23	14	40	12,924	.90	11,656	7.25
1929	55,019	1.38	76,114	12.19	9	60	13,586	.82	11,194	8.04
1930	52,622	1.21	63,463	12.62	7	136	13,793	.78	10,751	7.10
1931 [2]	53,449	1.20	64,233	9.06			11,977	.68	8,133	6.18

Bureau of Agricultural Economics. Italic figures are census returns; other acreage, production, and yield figures are estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text. See 1927 Yearbook, p. 927, for data for earlier years.

[1] Compiled from Commerce and Navigation of the United States, 1910–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1926; January and June issues, 1927–1931, and official records of the Bureau of Foreign and Domestic Commerce.

[2] Preliminary.

TABLE 283.—*Hay, tame: Estimated price per ton received by producers December 1, average 1925–1929, and annual 1927–1931*

State	Av., 1925–1929	1927	1928	1929	1930	1931	State	Av., 1925–1929	1927	1928	1929	1930	1931
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*		*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Me	12.06	12.70	11.40	11.00	10.90	9.90	N. C	19.02	18.00	17.30	17.80	19.30	13.00
N. H	16.28	16.30	14.10	13.50	13.70	11.80	S. C	19.14	18.00	18.50	19.20	18.80	11.90
Vt	12.40	11.70	11.60	11.00	11.00	9.50	Ga	17.44	16.30	15.60	16.30	15.90	10.00
Mass	21.24	21.00	19.10	19.20	18.90	17.90	Fla	19.94	18.20	19.00	17.50	17.00	12.70
R. I	22.90	22.00	22.00	22.00	22.60	19.40	Ky	16.42	14.50	16.50	15.70	19.70	10.00
Conn	21.98	21.70	18.90	19.10	20.20	17.00	Tenn	17.60	15.00	16.90	17.50	20.10	11.00
N. Y	12.88	11.30	11.30	12.20	14.40	8.80	Ala	17.00	15.00	15.80	16.20	15.10	9.00
N. J	18.20	17.50	14.60	18.60	21.60	14.20	Miss	15.88	15.00	15.20	15.50	16.50	9.60
Pa	14.92	13.50	12.50	13.10	19.70	12.10	Ark	15.68	14.00	14.40	16.00	14.80	8.30
Ohio	12.02	9.20	11.70	10.00	17.40	6.60	La	15.06	13.80	14.40	13.60	13.50	8.80
Ind	12.40	10.40	12.00	10.10	14.60	6.80	Okla	13.02	10.70	12.70	13.70	10.40	6.70
Ill	13.50	11.40	12.90	11.30	13.10	7.70	Tex	13.82	11.80	13.20	13.30	12.50	7.80
Mich	12.72	11.00	11.60	10.70	16.30	8.60	Mont	10.04	8.40	8.90	12.40	11.00	9.00
Wis	13.28	12.50	14.40	10.50	12.70	11.20	Idaho	9.60	8.70	11.00	10.80	8.40	8.20
Minn	10.90	9.00	9.70	10.60	10.20	8.30	Wyo	9.74	9.00	10.10	12.20	9.10	9.20
Iowa	13.10	12.50	13.00	11.00	11.50	8.40	Colo	10.60	9.20	11.70	11.50	9.20	7.60
Mo	11.44	9.90	10.60	10.40	12.00	6.80	N. Mex	15.08	13.40	16.90	18.10	13.00	11.00
N. Dak	8.24	7.80	6.70	8.50	7.00	5.80	Ariz	16.08	14.40	18.00	18.00	13.00	9.00
S. Dak	9.70	7.60	8.20	8.70	8.50	8.00	Nev	9.66	9.20	11.70	10.40	7.50	10.70
Nebr	11.02	8.50	10.00	10.50	8.00	7.20	Utah	11.46	10.00	12.20	15.60	9.10	9.80
Kans	10.98	8.60	9.40	11.80	9.70	6.50	Wash	14.30	12.90	13.10	16.80	13.30	8.60
Del	17.78	16.50	16.40	17.50	22.50	11.00	Oreg	12.02	11.20	11.70	14.60	9.60	8.50
Md	16.32	15.40	13.50	13.70	22.80	12.00	Calif	13.94	12.50	14.50	16.40	10.90	10.20
Va	17.46	16.00	15.30	15.50	22.40	12.00							
W. Va	16.84	15.00	14.70	15.10	23.00	12.40	U. S	12.74	11.29	12.23	12.19	12.62	9.06

Bureau of Agricultural Economics. As reported by crop reporters.

TABLE 284.—*Hay: Acreage, yield, and production, by States, averages, and annual 1930 and 1931*

State and division	Acreage						Yield per acre						Production					
	Tame hay			Wild hay			Tame hay			Wild hay			Tame hay			Wild hay		
	Average, 1924–1928	1930	1931 [1]	Average, 1924–1928	1930	1931 [1]	Average, 1919–1928	1930	1931	Average, 1919–1928	1930	1931	Average, 1924–1928	1930	1931 [1]	Average, 1924–1928	1930	1931
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*
Maine	1, 067	977	962	9	5	5	0. 85	0. 89	0. 98	0. 93	0. 80	1. 00	899	868	947	9	4	5
New Hampshire	378	350	344	10	4	4	. 94	1. 11	1. 10	. 90	. 70	. 90	344	387	377	9	3	4
Vermont	912	912	907	10	6	6	1. 09	1. 19	1. 34	. 96	. 80	. 85	1, 083	1, 084	1, 213	10	5	5
Massachusetts	372	336	334	10	6	6	1. 24	1. 27	1. 44	. 98	. 92	. 97	466	427	481	10	6	6
Rhode Island	37	35	34	2	1	1	1. 18	1. 17	1. 29	. 88	. 80	. 80	44	41	44	2	1	1
Connecticut	287	259	250	8	4	4	1. 16	1. 31	1. 29	1. 06	1. 00	1. 10	352	340	323	9	4	4
New York	4, 674	3, 955	3, 990	58	45	38	1. 15	1. 15	1. 33	. 96	1. 15	1. 10	5, 642	4, 542	5, 288	57	52	42
New Jersey	242	205	207	14	13	13	1. 52	1. 50	1. 70	1. 32	1. 10	1. 10	405	307	352	19	14	14
Pennsylvania	2, 893	2, 496	2, 455	18	13	12	1. 24	1. 20	1. 28	. 96	. 70	1. 05	3, 754	3, 001	3, 154	18	9	13
North Atlantic	10, 863	9, 525	9, 483	140	97	89	1. 14	1. 15	1. 28	1. 00	1. 01	1. 06	12, 989	10, 997	12, 179	143	98	94
Ohio	2, 922	2, 455	2, 519	5	4	5	1. 14	. 75	1. 27	1. 15	. 50	. 75	3, 161	1, 839	3, 196	5	2	4
Indiana	1, 870	1, 710	1, 749	14	8	8	1. 14	. 83	1. 15	. 93	. 87	. 89	2, 179	1, 416	2, 017	13	7	7
Illinois	2, 916	2, 485	2, 334	31	18	16	1. 14	. 99	1. 15	. 88	. 80	. 85	3, 428	2, 453	2, 673	27	14	14
Michigan	2, 721	2, 548	2, 394	33	40	39	1. 12	. 97	1. 06	1. 11	. 95	. 95	3, 043	2, 460	2, 544	36	38	37
Wisconsin	3, 349	3, 360	3, 180	204	244	249	1. 45	1. 49	1. 21	1. 24	1. 05	1. 00	5, 023	4, 992	3, 833	258	256	249
Minnesota	2, 373	2, 411	2, 536	1, 958	1, 889	1, 776	1. 39	1. 32	1. 09	1. 07	. 95	. 75	3, 455	3, 179	2, 756	1, 978	1, 795	1, 332
Iowa	3, 110	3, 099	2, 910	270	205	185	1. 22	1. 36	1. 14	1. 08	. 95	. 70	3, 849	4, 214	3, 312	268	195	130
Missouri	3, 309	3, 112	2, 787	142	129	135	1. 00	. 72	1. 00	1. 15	. 80	1. 00	3, 219	2, 242	2, 784	157	103	135
North Dakota	1, 007	1, 055	1, 571	1, 660	1, 799	1, 349	1. 27	1. 03	. 70	. 83	. 80	. 60	1, 367	1, 084	1, 097	1, 356	1, 439	809
South Dakota	1, 124	1, 178	1, 195	2, 598	2, 457	1, 769	1. 25	. 91	. 47	. 68	. 55	. 50	1, 273	1, 076	558	1, 625	1, 351	884
Nebraska	1, 615	1, 603	1, 614	3, 008	2, 902	2, 786	1. 74	1. 79	1. 26	. 77	. 75	. 55	2, 707	2, 867	2, 032	2, 151	2, 176	1, 532
Kansas	1, 432	1, 060	1, 094	931	901	892	1. 70	1. 52	1. 41	. 96	. 80	. 85	2, 471	1, 607	1, 545	875	721	758
North Central	27, 748	26, 076	25, 883	10, 853	10, 596	9, 209	1. 26	1. 13	1. 10	. 85	. 76	. 64	35, 177	29, 429	28, 347	8, 749	8, 097	5, 891
Delaware	69	60	63	2	2	2	1. 37	1. 00	1. 68	1. 15	1. 00	1. 50	100	60	106	2	2	3
Maryland	398	369	381	3	3	5	1. 23	. 84	1. 23	. 95	. 65	. 90	524	309	469	3	2	4
Virginia	950	811	904	13	8	9	1. 02	. 52	1. 10	. 80	. 50	. 80	966	424	993	10	4	7
West Virginia	752	620	648	10	11	6	1. 05	. 51	1. 00	1. 05	. 40	. 81	835	317	650	11	4	5
North Carolina	616	623	715	36	25	24	. 94	. 85	. 95	1. 10	. 75	1. 10	518	532	677	33	19	26
South Carolina	241	200	244	8	12	11	. 75	. 72	. 73	. 81	. 64	. 80	159	144	178	4	8	9

Georgia	560	521	675	17	19	19	.62	.60	53	1.00	.95	.90	292	312	360	18	18	17
Florida	82	73	78	4	4	4	.68	.58	.59	.84	.85	.70	47	42	46	3	3	3
South Atlantic	3,667	3,277	3,708	93	84	80	.96	.65	.94	1.00	.71	.92	3,441	2,140	3,479	84	60	74
Kentucky	1,159	1,071	1,154	30	13	10	1.02	.59	1.05	.92	.75	.90	1,172	629	1,208	30	10	9
Tennessee	1,172	1,188	1,236	48	48	38	1.02	.65	.95	.82	.53	.80	1,154	770	1,175	39	25	30
Alabama	477	432	615	30	42	42	.78	.71	.78	.81	.75	.80	361	306	477	22	32	34
Mississippi	306	250	320	35	38	38	1.20	.95	1.38	1.05	.60	1.10	344	237	440	37	23	42
Arkansas	547	486	570	140	169	152	1.03	.89	1.23	1.08	.60	1.10	564	432	701	151	101	167
Louisiana	191	152	166	15	20	26	1.17	1.23	1.68	1.18	.65	1.15	205	187	279	14	13	30
Oklahoma	454	398	445	493	506	481	1.60	1.23	1.28	1.02	.80	.83	661	490	568	483	405	399
Texas	513	491	543	173	195	205	1.08	.98	1.12	.96	.85	.85	557	479	606	158	166	174
South Central	4,819	4,468	5,049	964	1,031	992	1.08	.79	1.08	1.00	.75	.89	5,019	3,530	5,454	934	775	885
Montana	1,235	1,619	1,636	637	574	402	1.55	1.07	.91	.88	.65	.60	1,950	1,726	1,492	609	373	241
Idaho	1,016	1,033	1,052	96	97	93	2.21	2.41	2.04	1.20	.90	1.00	2,297	2,489	2,151	121	87	93
Wyoming	666	756	739	354	310	263	1.42	1.24	1.05	.93	.75	.50	945	936	775	335	232	132
Colorado	1,280	1,292	1,258	359	366	362	1.86	1.71	1.31	1.02	1.00	.80	2,264	2,215	1,647	381	366	290
New Mexico	163	150	162	28	23	23	1.95	2.14	2.07	.86	.80	.90	325	321	336	25	18	21
Arizona	134	120	126	7	12	12	2.50	2.77	2.89	.76	1.00	1.10	341	332	364	4	12	13
Utah	567	636	610	71	69	66	2.20	2.04	1.36	1.12	1.10	.95	1,269	1,295	831	82	76	63
Nevada	211	222	177	152	143	36	2.06	2.02	1.26	1.00	1.00	.80	407	448	223	151	143	29
Washington	846	804	845	29	31	31	1.96	1.94	2.06	1.30	1.20	1.15	1,702	1,556	1,738	39	37	36
Oregon	930	929	957	212	222	222	1.77	1.90	1.61	.86	.95	.85	1,592	1,768	1,538	188	211	189
California	1,626	1,715	1,764	135	138	97	2.36	2.50	2.09	1.09	1.20	.85	4,040	4,281	3,679	154	166	82
Western	8,674	9,276	9,326	2,079	1,985	1,607	1.96	1.87	1.58	.97	.87	.74	17,133	17,367	14,774	2,090	1,721	1,189
United States	55,771	52,622	53,449	14,129	13,793	11,977	1.31	1.21	1.20	.88	.78	.68	73,759	63,463	64,233	12,000	10,751	8,133

Bureau of Agricultural Economics. Estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text.

[1] Preliminary.

TABLE 285.—*Hay, tame, by kinds: Production by States, 1931* [1]

State	Alfalfa	Clover and timothy [2]	Sweetclover	Lespedeza (Japan clover)	Grains cut green for hay	Annual legumes	Millet, Johnson, Sudan grass, and other	All tame	Sorgo for forage and hay [3]
	1,000 short tons	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*
Maine	25	659			8		255	947	
New Hampshire	10	245			12		110	377	
Vermont	24	953			40		196	1,213	
Massachusetts	19	362			10		90	481	
Rhode Island	2	27			2		13	44	
Connecticut	27	190			13		93	323	
New York	539	4,158			72	9	510	5,288	
New Jersey	83	228			18	5	18	352	
Pennsylvania	251	2,754			20	21	108	3,154	
North Atlantic	980	9,576			195	35	1,393	12,179	
Ohio	427	2,574	35		31	109	20	3,196	
Indiana	367	997	23		51	525	54	2,017	
Illinois	576	1,265	29		16	577	210	2,673	
Michigan	978	1,403	42		28	9	84	2,544	
Wisconsin	813	2,847	26		50	16	81	3,833	
Minnesota	1,163	1,130	128		63		272	2,756	
Iowa	1,061	1,959	65		57	134	36	3,312	6
Missouri	308	1,730	24		125	402	195	2,784	169
North Dakota	242	32	237		484		102	1,097	
South Dakota	256	30	31		220		21	558	9
Nebraska	1,606	114	46		80		186	2,032	200
Kansas	1,114	201	21		37	23	149	1,545	990
North Central	8,911	14,282	707		1,242	1,795	1,410	28,347	1,374
Delaware	20	60			5	15	6	106	
Maryland	62	312			16	63	16	469	
Virginia	88	527			48	216	114	993	4
West Virginia	18	474			26	30	102	650	
North Carolina	10	84		49	75	351	108	677	
South Carolina	3				11	141	23	178	28
Georgia	7	2			17	284	50	360	20
Florida						32	14	46	36
South Atlantic	208	1,459		49	198	1,132	433	3,479	88
Kentucky	175	443		47	100	169	274	1,208	140
Tennessee	45	307		130	68	292	333	1,175	125
Alabama	6	5		5	13	335	113	477	65
Mississippi	59	3		88	6	166	118	440	56
Arkansas	155	106		29	82	161	168	701	153
Louisiana	45			36	2	124	72	279	17
Oklahoma	316	17	7		48	62	118	568	388
Texas	145				104	129	228	606	997
South Central	946	881	7	335	423	1,438	1,424	5,454	1,941
Montana	957	200	34		254		47	1,492	
Idaho	1,802	193			124		32	2,151	
Wyoming	493	111	7		64		100	775	
Colorado	1,152	199	10		150	20	116	1,647	165
New Mexico	266	14			36		20	336	108
Arizona	338				18		8	364	
Utah	770	33			12		16	831	
Nevada	182	18			5		18	223	
Washington	624	391			606		117	1,738	
Oregon	586	188			516		248	1,538	
California	2,699	49			802		129	3,679	
Western	9,869	1,396	51		2,587	20	851	14,774	273
United States	20,914	27,594	765	384	4,645	4,420	5,511	64,233	3,676

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.
[2] Excludes "sweetclover" and "Lespedeza."
[3] Not included in "All tame hay."

TABLE 286.—*Hay: Estimated average price per ton received by producers, United States, 1922–23 to 1931–32*

Crop year	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Weighted average
						ALL (LOOSE)							
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	11.44	10.78	10.68	10.87	11.38	11.82	11.98	12.04	12.18	12.54	12.82	12.32	11.68
1923–24	11.78	11.98	12.25	12.44	12.75	13.15	13.59	13.60	13.63	13.73	13.65	13.75	12.93
1924–25	13.49	12.95	12.68	12.64	12.88	12.69	12.70	12.83	12.39	12.48	12.17	11.82	12.76
1925–26	12.48	12.25	12.42	12.47	13.07	13.40	13.31	13.03	12.97	12.78	13.12	12.98	12.83
1926–27	12.96	13.04	12.88	13.08	13.22	13.47	13.38	13.64	13.48	13.26	13.20	13.10	13.23
1927–28	11.71	9.97	10.51	10.63	10.54	10.55	10.60	10.24	10.19	10.29	10.70	11.01	10.57
1928–29	10.86	10.39	10.59	10.60	10.89	11.23	11.61	12.06	12.37	12.30	12.15	11.88	11.29
1929–30	11.17	10.85	11.05	11.07	11.18	11.04	11.16	11.19	10.95	10.97	10.98	10.91	11.05
1930–31	10.47	11.31	12.14	12.17	12.19	11.33	11.21	10.92	10.66	10.59	10.54	9.97	11.29
1931–32	9.30	9.05	8.88	8.57	8.68	8.71							
						ALFALFA							
1922–23	10.61	10.54	11.15	11.87	12.70	13.31	14.06	14.02	14.33	14.09	14.40	13.63	12.82
1923–24	12.45	12.01	12.78	13.37	13.59	14.39	13.99	14.08	13.98	14.09	14.12	13.70	13.54
1924–25	13.19	13.84	13.59	12.85	13.91	13.40	14.50	14.78	14.44	14.08	14.34	12.83	13.81
1925–26	13.02	13.00	12.91	13.41	13.74	14.14	13.90	14.24	13.50	13.53	13.17	13.33	13.52
1926–27	12.94	13.15	13.13	13.29	13.79	13.57	13.83	14.21	14.38	13.85	13.59	13.03	13.57
1927–28	11.73	11.47	11.34	11.52	11.75	12.02	12.09	11.84	12.46	12.56	12.90	12.42	11.96
1928–29	11.98	11.82	12.20	12.82	13.29	13.90	14.54	15.34	16.07	16.20	15.50	14.50	13.90
1929–30	13.12	13.17	13.50	13.84	14.00	14.41	14.66	14.45	13.90	13.42	12.87	12.14	13.71
1930–31	11.44	12.16	12.85	12.97	12.94	12.52	12.21	11.74	11.29	11.01	10.87	10.24	11.99
1931–32	9.80	9.86	9.67	9.58	9.94	10.31							
						CLOVER							
1922–23	12.82	12.66	12.54	12.51	12.67	13.03	13.39	13.35	13.24	13.47	13.58	13.70	13.03
1923–24	13.52	13.51	14.12	14.73	14.94	15.82	15.51	15.93	16.31	16.08	15.92	15.95	15.14
1924–25	15.45	14.00	13.75	13.65	13.64	13.45	13.25	13.30	12.52	12.41	12.67	12.26	13.43
1925–26	13.03	13.67	14.06	14.09	14.74	15.28	14.79	14.82	14.79	14.88	15.13	15.07	14.52
1926–27	14.40	14.25	14.60	14.71	14.76	15.24	15.71	16.16	15.64	15.51	15.21	14.65	15.06
1927–28	13.11	12.16	11.78	11.91	11.86	11.91	12.24	11.96	12.02	12.23	12.51	12.63	12.15
1928–29	12.52	12.25	12.50	12.58	13.01	13.05	13.41	13.59	13.93	13.43	13.24	12.92	13.02
1929–30	11.60	11.61	11.82	11.77	11.82	11.97	12.24	12.24	12.31	12.27	12.19	12.25	11.99
1930–31	11.71	13.20	14.62	14.62	14.62	13.52	13.53	12.78	12.45	12.57	12.21	11.28	13.26
1931–32	10.30	10.15	9.81	9.65	9.65	9.70							
						TIMOTHY							
1922–23	14.33	13.61	13.44	13.70	13.93	13.91	14.41	14.46	14.59	14.64	14.96	14.95	14.18
1923–24	14.86	14.68	15.13	16.22	16.78	16.95	16.96	17.25	17.53	17.53	17.48	17.52	16.53
1924–25	16.74	15.24	14.47	14.54	14.00	14.37	14.29	14.24	13.31	13.39	13.38	13.05	14.30
1925–26	13.89	14.06	14.98	15.11	15.38	15.87	15.82	15.79	15.59	15.81	16.31	16.64	15.40
1926–27	16.01	15.52	15.32	15.49	15.62	15.81	14.58	15.82	15.39	15.05	15.14	14.97	15.42
1927–28	13.29	12.03	11.70	11.58	11.67	11.31	11.34	11.03	11.14	11.17	11.75	11.82	11.64
1928–29	11.68	11.70	11.77	11.86	12.18	12.35	12.45	12.99	13.01	12.86	12.64	12.57	12.31
1929–30	11.91	11.61	11.60	11.67	11.70	11.57	11.55	11.55	11.57	11.79	12.04	12.29	11.71
1930–31	12.32	13.53	14.76	14.82	14.87	14.58	14.50	14.36	14.16	14.09	13.76	12.84	14.14
1931–32	10.77	10.07	9.79	9.56	9.34	9.14							
						PRAIRIE							
1922–23	7.68	7.76	7.54	7.74	8.13	8.98	9.44	9.52	9.61	9.74	10.64	10.07	8.79
1923–24	9.17	8.97	8.58	9.19	9.07	9.26	8.84	8.87	8.66	8.78	8.74	8.54	8.92
1924–25	8.35	8.60	8.49	8.25	8.25	8.62	9.14	9.08	9.05	9.11	9.27	8.55	8.70
1925–26	8.93	8.55	9.24	9.41	9.39	9.78	9.73	9.53	9.48	9.08	9.54	9.59	9.36
1926–27	9.63	10.55	10.52	10.78	10.76	10.98	11.28	11.76	11.50	10.70	11.51	10.77	10.87
1927–28	9.15	8.65	7.98	7.67	7.47	7.55	7.41	6.98	6.79	6.96	7.32	7.59	7.64
1928–29	7.80	7.34	7.62	7.71	7.72	7.88	8.01	8.33	8.99	8.81	8.76	8.77	8.10
1929–30	8.21	7.96	8.13	7.97	8.11	8.18	8.30	8.41	8.11	8.12	7.96	7.78	8.12
1930–31	7.12	7.63	7.89	7.66	7.48	7.31	7.23	6.82	6.51	6.44	6.30	6.34	7.13
1931–32	6.52	6.64	6.68	6.52	6.67	6.56							

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices of all loose hay reported on 1st of month and 1st of succeeding month, July, 1922–December, 1923. For previous data on alfalfa, clover, timothy, and prairie hay see 1930 or earlier Yearbooks.

TABLE 287.—*Hay: Average price per ton at leading markets, by kind and grade, 1921–22 to 1930–31*

Year beginning July	Alfalfa, Kansas City		Clover, Cincinnati			Prairie upland, Kansas City		Timothy, Chicago	
	No. 1	No. 2	No. 1	No. 1, light mixed	No. 1, mixed	No. 1	No. 2	No. 1	No. 2
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1921–22	19.75	13.90	19.80	19.00	17.80	11.70	10.00	-------	-------
1922–23	22.10	16.80	16.40	17.40	16.40	14.40	12.90	22.30	18.50
1923–24	23.60	16.90	23.90	23.40	22.60	13.90	12.60	26.30	23.30
1924–25	20.10	15.00	17.90	18.00	17.20	11.20	9.80	23.90	19.50
1925–26	21.10	17.40	22.50	23.60	22.60	14.20	12.80	24.70	21.90
1926–27	19.00	16.60	22.90	21.20	21.70	14.50	12.70	21.80	19.70
1927–28	20.80	16.00	-------	15.70	16.40	10.90	8.90	18.60	16.40
1928–29	24.80	22.70	24.10	19.20	20.90	12.10	10.50	22.20	20.20
1929–30	22.10	17.90	17.20	18.00	17.60	11.70	10.30	19.00	16.70
1930–31	19.90	15.90	23.60	21.70	22.50	12.10	10.50	20.10	18.50

Bureau of Agricultural Economics. Compiled from reports made direct to the bureau.

TABLE 288.—*Alfalfa meal, No. 1 medium: Average price per ton, bagged, in car lots, Kansas City, 1922–23 to 1931–32*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	18.60	19.50	21.20	24.60	26.25	26.20	25.40	25.40	24.40	26.50	26.10	23.40	24.00
1923–24	21.50	22.40	25.50	25.70	26.90	25.20	26.25	23.90	23.20	20.90	21.20	21.75	23.70
1924–25	22.00	22.60	23.25	23.10	22.50	23.90	24.20	22.50	22.25	22.00	22.70	22.90	22.80
1925–26	23.00	24.00	24.25	24.40	24.10	24.40	24.80	24.00	23.10	23.90	25.40	23.90	24.10
1926–27	23.00	22.80	22.25	22.40	22.90	22.30	22.00	21.75	21.40	21.00	22.20	21.60	22.10
1927–28	21.75	22.40	23.40	23.10	22.75	23.30	24.40	26.25	29.40	33.50	34.25	31.70	26.40
1928–29	27.60	25.60	26.00	26.60	26.60	28.60	29.75	29.90	28.50	28.00	27.00	25.10	27.40
1929–30	23.50	25.00	27.30	27.50	26.80	27.40	27.40	25.50	23.60	25.00	23.80	22.00	25.40
1930–31	22.70	24.70	26.60	25.60	25.00	24.20	23.60	21.25	20.40	21.00	19.60	18.10	22.70
1931–32	17.90	16.80	17.60	17.20	19.00	18.60	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from reports made to the bureau.

TABLE 289.—*Pasture: Condition, 1st of month, United States, 1909–1931*

Year	May	June	July	Aug.	Sept.	Oct.	Year	May	June	July	Aug.	Sept.	Oct.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1909	79.1	86.9	91.8	86.4	------	------	1921	90.0	89.4	84.4	78.3	82.1	84.8
1910	86.9	87.1	79.7	71.5	------	------	1922	85.9	94.6	88.5	86.7	78.7	72.7
1911	83.1	82.7	67.2	62.7	------	------	1923	79.4	86.1	87.2	79.4	80.2	85.0
1912	82.9	92.5	89.7	87.3	------	------	1924	82.4	83.2	87.2	82.0	76.6	78.6
1913	85.5	88.1	81.6	74.3	------	------	1925	82.2	75.7	73.0	69.5	67.4	72.9
1914	88.9	90.0	83.0	76.2	------	------	1926	74.6	77.0	77.0	69.9	78.2	83.7
1915	88.4	92.5	93.2	95.5	97.7	95.9	1927	87.0	88.3	92.8	86.9	84.2	80.1
1916	84.8	90.8	94.8	84.5	79.8	76.9	1928	71.3	78.6	84.4	85.6	83.3	77.7
1917	79.9	83.1	84.1	78.5	77.5	75.5	1929	86.9	87.2	87.5	79.7	67.1	70.2
1918	81.6	89.3	82.0	72.4	67.7	73.5	1930	77.3	80.4	74.6	56.4	47.7	56.1
1919	91.1	97.4	95.8	85.3	81.6	78.9	1931	78.8	78.5	73.0	63.7	63.0	63.5
1920	79.3	90.2	91.4	87.7	88.1	86.9							

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

TABLE 290.—*Pasture:* [1] *Condition, 1st of month, by States, average 1920–1929, and 1931*

State and division	May		June		July		August		September		October	
	Average, 1920–1929	1931	Average, 1920–1929	1931	Average, 1920–1929	1931	Average, 1920–1929	1931	Average, 1920–1929	1931	Average, 1920–1929	1931
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Maine	86	86	88	90	87	93	86	91	82	87	79	91
New Hampshire	86	85	89	90	87	95	89	87	85	83	82	88
Vermont	86	86	88	93	91	96	93	95	89	90	87	89
Massachusetts	84	84	89	89	87	95	83	88	83	87	81	86
Rhode Island	84	80	89	87	88	88	84	88	82	90	80	83
Connecticut	82	82	88	91	87	95	82	90	82	88	82	82
New York	81	79	84	89	85	89	82	85	80	78	80	81
New Jersey	82	76	85	85	79	86	76	83	83	83	80	74
Pennsylvania	81	71	85	81	84	81	81	82	81	81	80	78
North Atlantic	81.8	77.4	85.5	86.6	85.0	87.4	82.5	85.1	81.6	81.2	80.2	80.9
Ohio	79	80	85	84	84	86	83	78	84	81	82	85
Indiana	79	80	85	81	85	81	78	70	81	70	81	79
Illinois	82	81	84	83	84	81	77	62	79	59	80	72
Michigan	72	68	84	76	83	77	75	52	72	41	78	66
Wisconsin	78	71	84	69	85	73	79	48	74	38	79	67
Minnesota	78	72	81	70	83	73	76	47	70	48	75	52
Iowa	84	80	83	72	86	70	81	50	84	44	88	63
Missouri	84	82	86	84	88	75	81	56	82	67	83	67
North Dakota	75	60	79	49	84	40	79	39	71	50	72	49
South Dakota	78	75	79	63	82	50	78	27	73	27	74	25
Nebraska	84	87	87	80	88	67	82	50	78	48	79	48
Kansas	83	88	86	88	87	80	83	68	78	69	82	60
North Central	80.9	79.1	84.1	77.3	85.3	73.3	79.9	55.9	78.5	55.2	80.7	62.7
Delaware	82	67	84	78	74	81	74	76	78	80	74	71
Maryland	79	64	82	72	77	77	74	81	79	83	77	80
Virginia	80	73	83	88	80	88	80	90	84	95	79	89
West Virginia	81	70	85	84	87	82	87	80	88	86	84	86
North Carolina	84	83	83	85	85	73	83	83	83	89	79	76
South Carolina	81	75	78	79	79	62	79	71	75	72	71	51
Georgia	82	79	82	77	82	49	83	66	77	69	72	52
Florida	80	83	81	78	87	66	90	76	90	80	86	78
South Atlantic	81.0	74.5	82.9	82.4	82.4	74.4	82.3	80.1	82.4	84.5	78.4	76.3
Kentucky	83	82	86	85	88	78	83	73	83	84	82	79
Tennessee	83	80	86	79	85	60	80	72	81	78	78	61
Alabama	83	77	84	79	82	57	80	70	76	76	70	51
Mississippi	84	80	85	79	85	73	80	86	78	85	73	66
Arkansas	83	83	87	81	85	78	80	83	74	87	74	66
Louisiana	84	80	86	83	87	70	82	77	79	78	77	63
Oklahoma	83	78	87	81	87	71	80	64	72	58	75	45
Texas	84	88	87	83	86	71	78	72	70	65	74	54
South Central	83.5	83.5	86.5	81.9	86.0	70.1	79.3	72.2	74.1	70.3	75.2	57.2
Montana	80	60	88	47	91	43	84	34	80	41	79	45
Idaho	86	81	92	79	89	75	84	60	81	58	80	62
Wyoming	87	80	96	77	98	74	93	54	91	63	90	60
Colorado	85	86	89	84	89	76	84	61	86	54	82	53
New Mexico	73	94	82	93	78	80	75	75	81	83	79	81
Arizona	84	88	82	86	79	85	80	80	85	90	84	87
Utah	86	80	92	75	87	58	84	45	83	48	82	44
Nevada	85	82	90	75	88	57	86	53	84	50	84	51
Washington	84	85	88	85	85	84	74	80	70	65	74	73
Oregon	90	87	93	82	90	82	84	70	78	63	78	65
California	85	58	83	59	81	58	79	53	78	51	76	51
Western	83.5	74.2	87.1	70.8	86.4	65.8	82.2	56.6	81.0	56.8	79.8	57.4
United States	81.9	78.8	85.0	78.5	85.3	73.0	80.6	63.7	78.6	63.0	79.3	63.5

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] For range States, conditions given as reported. Probably relates largely to farm pasture; i. e., range not included.

TABLE 291.—*Hops: Acreage, production, December 1 price, imports, exports, and consumption in the United States, 1922–23 to 1931–32*

Year beginning July	Acreage	Average yield per acre	Production	Price per pound received by producers Dec. 1	Imports [1]	Domestic exports [1]	Net exports [1]	Consumption by brewers [2]
	Acres	*Pounds*	*1,000 pounds*	*Cents*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
1922–23	23,400	1,186	27,744	8.6	1,295	13,497	12,401	4,556
1923–24	18,440	1,071	19,751	18.8	761	20,461	19,832	3,815
1924–25	20,350	1,360	27,670	10.3	439	16,122	15,737	[3] 3,256
1925–26	20,350	1,404	28,573	21.8	581	14,998	14,592	[3] 3,426
1926–27	20,800	1,516	31,522	23.1	470	13,369	12,936	[3] 3,149
1927–28	24,600	1,246	30,658	22.9	753	11,812	11,087	[3] 3,071
1928–29	26,200	1,257	32,944	19.3	649	8,836	8,198	2,735
1929–30	24,400	1,360	33,195	11.4	926	6,793	5,901	2,627
1930–31	19,500	1,202	23,447	14.8	1,026	5,593	4,583	2,197
1931–32 [4]	21,400	1,208	25,852	13.8				

Bureau of Agricultural Economics. Compiled from reports of the Division of Crop and Livestock Estimates, Bureau of Foreign and Domestic Commerce, records of the Bureau of Internal Revenue, 1922–23 to 1925–26; annual reports of the Commissioner of Prohibition, 1926–27 to 1929–30; and Commissioner of Industrial Alcohol, 1930–31.

[1] Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1922–1926; January and June issues, 1927–1931, and official records of the Bureau of Foreign and Domestic Commerce.
[2] Figures represent hops used to make cereal beverages.
[3] Not including 57,936 pounds in 1924, 71,508 pounds in 1925, 960 pounds in 1926, and 6,294 pounds in 1927 used in the manufacture of distilled spirits.
[4] Preliminary.

TABLE 292.—*Hops: Acreage, yield per acre, and production in specified countries, 1929–30 to 1931–32*

Country	Acreage			Yield per acre			Production		
	1929–30	1930–31	1931–32 [1]	1929–30	1930–31	1931–32	1929–30	1930–31	1931–32 [1]
	Acres	*Acres*	*Acres*	*Pounds*	*Pounds*	*Pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
North America:									
Canada [2]	1,165	948		1,240	1,230		1,445	1,166	
United States [3]	24,400	19,500	21,400	1,360	1,202	1,208	33,195	23,447	25,852
Europe:									
England and Wales	23,986	[4] 19,997	[4] 19,536	1,677	[5] 1,718	[5] 1,055	40,219	28,336	18,928
Belgium	3,155	2,545	3,000	1,385	1,163	757	4,370	2,961	2,271
France	10,509	8,169		1,311	794		13,776	6,487	
Germany	37,619	32,306	25,387	799	754	494	30,074	24,366	[6] 12,544
Austria	731	170		360	365		263	62	
Czechoslovakia	41,330	38,449	30,000	630	843	824	26,053	32,431	24,725
Hungary	576	574		564	537		325	308	
Yugoslavia	12,629	7,139		797	543		10,065	3,873	[6] 3,024
Rumania	264	175		462			122		
Poland	6,264	5,671		613	583		3,842	[6] 3,307	[6] 3,920
Total European countries reporting all years	106,090	93,297	77,923				114,623	95,274	65,412
Oceania:									
Australia	1,398			1,674			2,340		
New Zealand	598			1,410			843		
Total countries reporting all years	130,490	112,797	99,323				147,818	118,721	91,264
Estimated world total, excluding Russia [7]	164,624	138,000					166,932	130,000	

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture except as otherwise stated. Acreage and production figures are for the harvesting season 1929 to 1931 in the Northern Hemisphere and 1929–30 to 1931–32 in the Southern Hemisphere.

[1] Preliminary.
[2] British Columbia.
[3] Principal producing States.
[4] These figures include the acreage left unpicked, which was estimated at 3,500 acres in 1930 and 1,600 acres in 1931.
[5] Yield based on acreage picked.
[6] Unofficial estimate.
[7] Exclusive of acreage and production in minor producing countries for which no data are available.

TABLE 293.—*Hops: International trade, average 1925–1929, annual 1927–1930*

Country	Average 1925–1929 Exports	Average 1925–1929 Imports	1927 Exports	1927 Imports	1928 Exports	1928 Imports	1929 Exports	1929 Imports	1930 [1] Exports	1930 [1] Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Czechoslovakia	15, 936	1, 228	17, 904	1, 139	14, 452	1, 644	18, 711	374	19, 890	11
United States	12, 654	612	14, 119	554	7, 985	581	7, 677	765	7, 640	1, 099
Yugoslavia	9, 427	231	9, 030	274	16, 929	198	7, 269	218	5, 966	167
France	5, 601	4, 458	5, 682	5, 407	3, 612	4, 338	3, 438	4, 600	2, 669	4, 516
Poland	3, 552	447	3, 843	593	4, 699	366	5, 708	636	4, 570	475
New Zealand	387	6	530	4	408	1	266	1	204	1
Russia [2]	346	126	2	2	1, 569	0	161	0	9	7
Australia [2]	269	208	397	145	618	157	131	121	15, 164	12, 376
Total	48, 172	7, 316	51, 507	8, 118	50, 272	7, 285	43, 361	6, 715	56, 112	18, 652
PRINCIPAL IMPORTING COUNTRIES										
Germany	2, 964	11, 408	3, 825	10, 722	3, 092	9, 967	5, 080	8, 011	5, 721	6, 190
United Kingdom	4, 672	7, 855	6, 119	10, 855	1, 977	7, 412	1, 478	6, 967	2, 498	4, 950
Irish Free State	0	5, 997	0	5, 174	0	5, 852	0	5, 624	0	5, 874
Belgium	2, 173	5, 300	1, 853	4, 489	1, 433	6, 321	449	6, 444	370	7, 171
Austria	117	3, 082	62	2, 929	201	3, 088	68	3, 382	37	3, 074
Canada	387	2, 574	709	1, 962	488	2, 397	296	2, 823	216	3, 386
Netherlands	89	1, 273	24	1, 556	50	1, 246	28	1, 672	24	1, 479
Brazil	0	1, 101	0	1, 075	0	1, 261	0	1, 238	0	913
Switzerland	0	1, 097	0	1, 072	0	1, 189	0	1, 418	0	1, 263
Sweden	1	1, 081	1	1, 287	0	1, 057	0	1, 114	1	1, 281
Argentina	0	1, 051	0	1, 042	0	1, 241	0	831	0	1, 224
Japan	0	908	0	1, 011	0	1, 002	0	823	0	1, 158
Denmark	1	814	0	811	0	896	1	877	[2] 1	1, 214
Italy	8	672	0	626	10	743	1	442	5	586
Union of South Africa	0	530	0	709	0	496	0	402	0	513
Norway	0	334	0	346	0	199	0	360	0	255
Hungary	121	310	146	444	188	278	69	198	85	135
British India	0	166	0	148	0	129	0	172	0	114
Total	10, 533	45, 553	12, 739	46, 258	7, 439	44, 774	7, 470	42, 798	8, 958	40, 780

Bureau of Agricultural Economics. Official sources except where otherwise noted. Lupulin and hopfenmehl (hop meal) are not included when given separately.

[1] Preliminary. [2] Internatial Yearbook of Agriculture Statistics.

TABLE 294.—*Peanuts: Acreage, yield per acre, production, and December 1 price, United States, 1919–1931*

Year	Peanuts, all: Total acreage [1]	Peanuts, all: Yield per acre	Peanuts, all: Total production [2]	Peanuts gathered: Area	Peanuts gathered: Yield per acre	Peanuts gathered: Total quantity gathered	Peanuts gathered: Farm price, Dec. 1 [3]
	1,000 acres	*Pounds*	*1,000 lbs.*	*1,000 acres*	*Pounds*	*1,000 lbs.*	*Cents*
1919				1, 132	691. 9	783, 273	9. 33
1920				1, 181	712. 5	841, 474	5. 26
1921				1, 214	683. 1	829, 307	3. 99
1922				1, 005	630. 0	633, 114	4. 68
1923				896	722. 9	647, 762	6. 78
1924	1, 830	615. 3	1, 125, 932	1, 187	627. 7	745, 059	4. 60
1925	1, 563	666. 4	1, 041, 514	958	729. 1	698, 475	3. 64
1926	1, 315	669. 1	879, 923	843	749. 5	631, 825	[4] 4. 54
1927	1, 786	735. 0	1, 312, 643	1, 142	757. 0	864, 549	[4] 3. 98
1928	1, 930	661. 2	1, 276, 078	1, 211	706. 1	855, 096	[4] 4. 44
1929	2, 001	670. 4	1, 341, 416	1, 360	703. 3	956, 448	[4] 3. 63
1930	1, 862	632. 0	1, 176, 700	1, 133	659. 4	747, 085	[4] 3. 25
1931 [5]	2, 172	715. 7	1, 554, 410	1, 419	763. 3	1, 083, 110	[4] 1. 88

Bureau of Agricultural Economics. Estimates of the crop-reporting board. See 1930 Yearbook, p. 813, for data for earlier years.

[1] Including acres planted in corn reduced to equivalent solid acres as well as the acreage grown alone.
[2] Including peanuts grazed or otherwise utilized as well as those gathered.
[3] Farm prices are as of Nov. 15, 1919–1923; Dec. 1, 1924–1931.
[4] Average of State prices weighted by total production
[5] Preliminary.

TABLE 295.—*Peanuts: International trade, average 1925–1929, annual 1928–1930*

Country	Calendar year							
	Average, 1925–1929		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
British India	1,320,173	0	1,676,871	0	1,828,689	0	1,322,041	0
Senegal	951,057	66	911,494	[2] 20	[2] 896,867	[2] 131	[2] 1,120,411	[2] 5
China	408,762	42,314	276,447	108,966	272,645	55,718	582,081	16,968
Nigeria	266,702	0	231,081	0	[2] 330,079	0	[2] 327,868	0
French possessions in China	[3] 251,847	0	267,039	0	--------	0	--------	0
Gambia	134,328	0	166,750	0	126,235	0	167,465	0
Dutch East Indies	61,251	735	104,402	1,018	60,153	818	45,242	749
Mozambique	54,487	21	76,360	5	50,838	68	54,897	81
Tanganyika	25,728	0	23,733	0	17,394	0	[2] 58,238	0
Anglo-Egyptian Sudan	12,732	0	4,001	0	8,258	0	10,659	0
French Guiana	10,722	2	14,716	0	[2] 11,232	0	[2] 4,824	0
Spain	3,252	0	[2] 2,572	0	[2] 2,349	0	[2] 2,834	0
Brazil	439	0	60	0	238	0	36	0
Total	3,501,480	43,138	3,755,526	110,009	3,604,977	56,735	3,696,596	17,803
PRINCIPAL IMPORTING COUNTRIES								
France	12,863	1,619,507	10,469	1,731,759	11,707	1,891,117	5,088	1,957,755
Germany	0	1,311,186	0	1,883,601	0	2,050,751	0	2,023,086
United Kingdom	0	286,186	0	323,247	0	388,223	0	346,993
Italy	99	252,338	59	305,783	72	376,983	111	135,764
Netherlands	3,278	203,972	3,695	165,465	3,046	203,543	2,890	241,825
United States	4,569	78,563	5,419	97,533	4,880	44,555	2,959	10,470
Belgium	244	61,350	266	59,203	187	69,344	140	52,435
Denmark	0	40,102	0	51,033	0	61,719	0	69,429
British Malaya	12,361	30,390	35,255	54,204	9,872	28,607	3,573	21,387
Canada	0	29,783	0	31,408	0	34,961	0	29,876
Japan	885	26,603	658	26,030	140	33,131	150	36,471
Sweden	0	16,095	0	23,582	0	14,459	0	14,940
Algeria [2]	313	10,025	252	11,713	178	13,469	135	10,954
Egypt	2,599	6,894	2,113	2,783	1,266	4,310	1,648	7,446
Tunis	0	4,769	0	4,854	0	5,815	0	4,743
Union of South Africa	401	4,524	969	7,371	461	5,629	904	3,334
Argentina	112	4,029	80	11	82	9,817	22	6,982
Australia [2]	0	[3] 3,442	0	2,366	0	2,329	0	505
Philippine Islands	0	3,051	0	3,178	0	3,600	1,148	3,661
Poland	1	1,847	0	1,089	0	1,307	0	950
Yugoslavia	0	1,578	0	226	0	5,448	0	3,570
Total	37,725	3,996,234	59,235	4,786,439	31,891	5,249,117	18,768	4,982,576

Bureau of Agricultural Economics. Official sources except where otherwise noted. Include shelled and unshelled, assuming the peanuts to be unshelled unless otherwise stated. When shelled nuts were reported they have been reduced to terms of unshelled at the ratio of 3 pounds unshelled to 2 pounds of shelled.

[1] Preliminary. [2] International Yearbook of Agricultural Statistics. [3] 4-year average.

TABLE 296.—*Peanuts: Estimated average price per pound, in the shell, received by producers, United States, 1922–23 to 1931–32*

Crop year	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Weighted average
1922–23	5.2	5.0	5.9	6.5	6.7	7.1	7.1	7.3	6.9	6.7	6.7	7.0	5.5
1923–24	6.8	6.2	6.4	6.7	6.8	6.7	6.4	6.5	6.4	6.6	6.4	6.4	6.5
1924–25	6.3	5.6	5.4	5.5	5.9	5.7	6.2	6.2	5.4	5.2	5.7	4.7	5.7
1925–26	5.1	4.4	4.5	4.7	4.6	5.1	5.0	4.7	5.3	5.3	5.1	4.9	4.7
1926–27	4.6	4.7	4.9	5.4	5.6	5.7	5.9	6.6	6.4	6.4	6.0	4.9	4.8
1927–28	4.6	5.2	5.4	5.4	5.4	5.5	5.7	5.6	5.5	5.5	5.0	4.6	5.0
1928–29	4.8	5.1	5.0	5.1	5.1	5.2	5.0	5.1	4.9	4.7	4.6	4.4	4.9
1929–30	4.0	3.8	3.7	3.5	3.5	3.5	3.7	3.6	3.7	3.8	3.9	4.2	3.8
1930–31	3.8	3.2	3.2	3.6	3.7	3.9	4.1	3.9	3.8	3.6	3.1	2.3	3.4
1931–32	2.2	2.0	------	------	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by estimated monthly marketings. For previous data see 1930 or earlier year books.

TABLE 297.—*Peanuts: Acreage, yield per acre, production, and December 1 price, by States, 1928–1931*

State	Peanuts gathered															
	Acreage				Yield per acre				Production				Farm price, Dec. 1			
	1928	1929	1930	1931 [1]	1928	1929	1930	1931	1928	1929	1930	1931 [1]	1928	1929	1930	1931
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Va.	152	153	138	152	928	1,030	720	1,080	141,056	157,590	99,360	164,160	4.7	3.9	3.1	1.9
N. C.	205	230	218	266	1,050	1,020	900	1,150	215,250	234,600	196,200	305,900	4.9	4.0	3.3	2.1
S. C.	10	10	12	14	690	735	700	650	6,900	7,350	8,400	9,100	4.2	3.4	4.0	3.5
Ga.	350	392	333	410	540	650	650	660	189,000	254,800	216,450	270,600	4.4	3.4	3.3	1.5
Fla.	44	58	46	55	575	600	560	580	25,300	34,800	25,760	31,900	4.2	3.5	3.3	2.2
Tenn.	18	16	13	9	800	760	550	700	14,400	12,160	7,150	6,300	4.7	3.3	3.3	2.0
Ala.	225	229	195	273	560	550	600	600	126,000	125,950	117,000	163,800	3.9	3.0	2.8	1.5
Miss.	10	14	13	20	600	640	520	650	6,000	8,960	6,760	13,000	6.5	6.5	6.0	4.0
Ark.	12	14	9	19	720	564	475	560	8,640	7,896	4,275	10,640	6.4	5.0	4.5	4.0
La.	12	10	10	13	450	540	415	600	5,400	5,400	4,150	7,800	6.6	6.5	6.0	5.0
Okla.	47	71	22	27	750	542	460	540	35,250	38,482	10,120	14,580	4.5	3.9	3.0	2.0
Tex.	126	163	124	161	650	420	415	530	81,900	68,460	51,460	85,330	3.8	3.7	3.5	2.0
U. S.	1,211	1,360	1,133	1,419	706.1	703.3	659.4	763.3	855,096	956,448	747,085	1,083,110	[2] 4.44	[2] 3.63	[2] 3.25	[2] 1.88

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.
[2] Average of State prices weighted by total production, which includes peanuts grazed or otherwise utilized as well as those gathered.

TABLE 298.—*Peanuts: Monthly average prices of cleaned and shelled peanuts, for prompt shipment, f. o. b. important shipping points, 1930–31*

VIRGINIA-NORTH CAROLINA SECTION: VIRGINIA, NORTH CAROLINA, AND TENNESSEE [1]

Description	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
Cleaned Virginias:	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Jumbos	7¾	8¼	8½	8¼	8⅛	8⅛	8	8	8	7⅞	7¾	6⅞
Fancys	5⅞	6⅛	6½	6⅜	6⅜	6⅜	6⅜	6⅜	6¼	6¼	5⅞	5
Extras	5	5¼	5⅜	5⅜	5⅜	5⅜	5¾	5⅝	5⅝	5½	5¼	4
Shelled Virginias:												
Extra large	7¾	7	7¼	7⅜	7⅞	8½	8⅜	8⅛	8⅛	7⅝	6⅞	6⅛
No. 1	6½	6	6½	6⅞	7¼	7⅝	7⅝	7½	7¼	6⅝	5⅝	4½
No. 2	5	4⅝	5⅛	5¾	5¾	5⅞	5⅞	5¾	5½	5¼	4⅛	3

SOUTHEAST SECTION: SOUTH CAROLINA, GEORGIA, ALABAMA, AND FLORIDA [2]

Description	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
Shelled:												
Spanish, No. 1	5¾	5½	6	6⅝	6½	6¾	6¾	6½	6¼	5¾	4¼	2⅞
Spanish, No. 2	4⅞	4½	5	5⅝	5½	5⅞	6	5⅞	5⅜	4¾	3⅝	2⅜
Runners, No. 1	4⅞	4¾	5⅝	6⅜	6⅜	6⅝	6½	------	------	------	------	2⅝
Runners, No. 2	4¼	4¼	4¾	------	5¼	5¾	------	5¾	------	------	------	2¼

SOUTHWEST SECTION: TEXAS, OKLAHOMA, ARKANSAS [3]

Description	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
Shelled:												
Spanish, No. 1	6¼	5⅞	6¼	7⅛	7⅛	7¾	7¾	7⅞	8	------	3¾	3⅛
Spanish, No. 2	5⅝	5¼	5¼	6⅜	6¼	6½	6⅞	6¾	6¾	------	3¼	2⅝

Bureau of Agricultural Economics. Based on returns from cleaners, shellers, and brokers. Crop year extends from November to next October in the Virginia-North Carolina section; farther south it begins earlier.

[1] Important shipping points: Boykins, Franklin, Norfolk, Petersburg, Suffolk, and Zuni, Va.; Ahoskie, Edenton, Elizabethtown, Enfield, Scotland Neck, Tarboro, and Williamston, N. C.
[2] Important shipping points: Albany, Americus, Arlington, Ashburn, Bainbridge, Blakely, Cairo, Camilla, Coleman, Cordele, Dawson, Donalsonville, Fort Gaines, Leary, Pelham, Shellman, Tifton, and Valdosta, Ga.; Andalusia, Brundidge, Dothan, Elba, Enterprise, Eufaula, Headland, and Troy, Ala.; Greenwood and Marianna, Fla.
[3] Important shipping points: De Leon, Denison, Dublin, and Fort Worth, Tex; Durant and Hugo, Okla.

TABLE 299.—*Peanut oil, crude and virgin: Peanuts, crushed, and quantity of oil produced in United States, 1919–20 to 1930–31*

Year beginning October	Peanuts crushed [1]					Oil produced				
	October-December	January-March	April-June	July-September	Total	October-December	January-March	April-June	July-September	Total
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
1919-20	4,364	5,867	9,214	15,770	35,215	1,395	1,207	2,311	3,498	8,411
1920-21	27,414	27,962	32,923	23,480	111,779	6,069	7,287	8,913	5,958	28,227
1921-22	40,338	44,152	25,964	4,703	115,157	11,075	11,381	6,771	1,236	30,463
1922-23	13,169	9,081	8,436	941	31,627	3,256	1,700	1,998	255	7,209
1923-24	6,164	4,676	5,471	1,928	18,239	1,406	1,122	1,328	438	4,294
1924-25	17,668	24,678	16,893	9,096	68,335	3,804	5,265	4,091	1,974	15,134
1925-26	17,134	17,880	10,668	4,389	50,071	3,827	4,001	3,093	1,006	11,927
1926-27	10,576	11,143	6,321	6,966	35,006	2,544	2,446	1,400	1,600	7,990
1927-28	21,810	24,168	8,177	6,661	60,816	5,144	5,324	1,920	1,626	14,014
1928-29	14,740	19,596	10,392	11,320	56,048	3,569	4,463	2,331	2,614	12,977
1929-30	31,598	50,888	25,606	12,672	120,764	6,723	11,192	6,413	2,751	27,079
1930-31 [2]	22,744	23,940	17,950	4,996	69,630	5,139	5,214	4,061	1,134	15,548

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census on "Animal and vegetable fats and oils."

[1] Quantities reported in terms of hulled have been converted to "in the hull" basis by multiplying by 1.5.
[2] Preliminary.

TABLE 300.—*Peanut oil: International trade, average 1925–1929, annual 1927–1930*

Country	Calendar year									
	Average 1925–1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
France	70,810	10,793	62,483	12,728	76,820	13,293	93,704	14,495	75,860	14,512
China	70,538	0	78,889	0	44,326	0	41,369	0	110,880	0
Germany	58,861	8,040	52,507	5,861	83,763	3,207	113,267	4,008	86,785	3,378
Dutch East Indies	4,262	1,676	1,843	1,756	9,976	1,779	7,011	1,951	4,703	2,438
Denmark	4,046	1,203	2,743	1,399	5,137	838	8,781	800	9,964	1,846
Total	208,517	21,712	198,465	21,744	220,022	19,117	264,132	21,254	288,192	22,174
PRINCIPAL IMPORTING COUNTRIES										
Netherlands	31,567	58,871	34,735	61,789	34,865	71,595	35,005	60,846	34,939	34,287
United Kingdom	21,326	37,167	9,354	46,411	25,754	35,056	23,993	49,542	6,895	49,820
Algeria	364	29,416	[2] 251	23,477	[2] 190	35,105	[2] 575	43,152	[2] 1,402	45,122
Canada	0	20,992	0	4,811	0	14,187	0	31,037	0	56,556
Italy	114	13,388	170	16,589	83	18,053	106	8,318	148	1,211
Belgium	4,343	9,717	5,608	6,526	3,532	10,081	2,665	15,976	2,310	22,842
Norway	0	7,782	0	7,124	0	7,505	0	7,745	0	4,423
Sweden	2,177	7,275	4,299	4,702	2,819	6,729	1,959	10,009	1,692	9,353
United States	0	4,427	0	2,847	0	4,749	0	3,231	0	15,565
Tunis	0	4,283	0	6,485	0	4,540	0	4,557	0	1,694
Philippine Islands	0	4,163	0	5,483	0	3,892	0	4,123	0	3,714
Czechoslovakia	386	3,360	81	3,510	280	3,903	1,516	6,443	783	5,649
Finland	0	2,367	0	1,976	0	3,004	0	3,574	0	[2] 2,774
Morocco	0	1,878	0	1,163	0	1,483	0	3,236	0	[2] 7,006
Total	60,277	205,086	54,498	192,893	67,523	219,882	65,759	251,789	48,169	260,016

Bureau of Agricultural Economics. Official sources except where otherwise noted. Conversions made on the basis of 7.5 pounds to the gallon.

[1] Preliminary.
[2] International Yearbook of Agricultural Statistics.

TABLE 301.—*Peanut oil, refined: Average price per pound, in barrels, New York, 1922–23 to 1931–32*

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922–23	12.40	12.25	13.03	14.25	16.88	17.38	17.85	17.75	16.56	16.00	16.00	16.00	15.53
1923–24	16.00	16.00	15.59	14.80	14.75	14.75	14.75	14.75	14.88	15.25	15.25	15.56	15.19
1924–25	16.45	16.25	16.25	16.25	16.75	16.75	16.75	16.75	15.20	15.00	15.00	15.00	16.03
1925–26	15.00	15.00	15.00	15.00	15.00	15.50	16.00	16.00	16.00	16.00	16.00	16.00	15.54
1926–27	16.00	16.00	15.50	14.62	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.84
1927–28	14.50	14.50	14.30	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.73
1928–29	13.50	13.50	12.25	11.00	13.50	13.50	13.50	13.44	13.25	13.25	13.25	13.25	13.10
1929–30	13.25	13.25	13.25	13.25	12.85	12.75	12.75	12.35	11.75	11.75	11.75	11.75	12.56
1930–31	11.38	13.50	13.50	13.50	13.50	13.50	13.50	13.10	12.50	12.50	12.50	12.50	12.96
1931–32	12.50	10.30	10.35	10.38	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from Oil, Paint, and Drug Reporter, average of weekly range. See 1930 Yearbook, p. 817, Table 334, for data for earlier years.

TABLE 302.—*Peas, dry field: Acreage, yield per acre, and production, by States, 1929, 1930, and 1931*

State	Acreage			Yield per acre			Production		
	1929	1930	1931 [1]	1929	1930	1931	1929	193	1931 [1]
	1,000 acres	*1,000 acres*	*1,000 acres*	*Bushels*	*Bushels*	*Bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Michigan	27	28	29	13.0	11.0	8.5	351	308	246
Wisconsin	30	30	25	15.5	14.5	10.5	465	435	262
Montana	25	30	33	15.5	17.5	13.5	388	525	446
Idaho	56	64	55	20.0	20.0	19.0	1,120	1,280	1,045
Colorado	49	49	49	12.0	12.0	9.0	588	588	441
United States	187	201	191	15.6	15.6	12.8	2,912	3,136	2,440

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.

TABLE 303.—*Clover seed (red and alsike), sweetclover seed, Lespedeza (Japan clover) seed, and alfalfa seed: Acreage, yield per acre, production, and December 1 price, by States, 1929–1931*

CLOVER SEED (RED AND ALSIKE)

State	Acreage			Average yield per acre			Production			Price per bushel received by producers Dec. 1		
	1929	1930	1931 [1]	1929	1930	1931	1929	1930	1931 [1]	1929	1930	1931
	Acres	*Acres*	*Acres*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Dolls.*	*Dolls.*	*Dolls.*
N. Y	9,000	2,700	4,000	1.8	1.9	1.6	16,200	5,100	6,400	14.00	14.00	9.70
Pa	13,000	8,000	12,000	1.5	1.5	1.7	19,500	12,000	20,400	15.25	15.00	12.50
Ohio	255,000	107,000	160,000	1.3	1.0	1.4	331,500	107,000	224,000	10.20	13.00	7.00
Ind	262,000	149,000	131,000	1.2	0.9	1.0	314,400	134,100	131,000	9.80	11.80	6.40
Ill	203,000	162,000	121,000	1.2	1.1	1.2	243,600	178,200	145,200	10.25	12.40	7.20
Mich	208,000	125,000	81,000	1.5	1.2	1.35	312,000	150,000	109,400	9.50	12.40	6.90
Wis	216,000	138,500	83,000	1.6	1.4	1.2	345,600	193,900	99,600	9.90	11.40	7.50
Minn	112,000	96,000	87,000	1.7	2.0	1.1	190,400	192,000	95,700	10.50	11.80	7.00
Iowa	249,000	118,000	78,000	1.2	1.25	1.0	298,800	147,500	78,000	11.00	12.50	8.50
Mo	90,000	63,000	50,000	1.2	1.2	1.2	108,000	75,600	60,000	9.60	11.75	8.50
N. Dak	2,000	1,000	1,000	3.0	3.0	1.5	6,000	3,000	1,500	9.60	11.75	8.00
Nebr	19,000	17,300	13,800	1.6	1.8	1.6	30,400	31,100	22,100	11.00	11.20	8.00
Kans	11,000	17,000	8,500	1.6	1.6	1.5	17,600	27,200	12,800	9.70	11.00	6.70
Md	22,000	5,000	(2)	1.4	1.4	------	30,800	7,000	---------	14.60	11.40	------
Va	21,000	5,000	(2)	1.55	.3	------	32,600	1,500	---------	14.00	11.00	------
Ky	16,000	3,000	1,000	1.6	1.1	2.0	25,600	3,300	2,000	13.00	14.40	9.70
Tenn	11,000	3,000	3,000	2.1	2.0	1.5	23,100	6,000	4,500	13.75	14.60	10.50
Idaho	47,000	34,000	30,000	4.2	5.1	4.6	197,400	173,400	138,000	9.20	9.90	6.00
Wyo	2,500	2,500	2,000	2.3	5.0	1.5	5,800	12,500	3,000	12.00	11.00	6.00
Colo	2,500	2,000	2,000	6.0	5.0	4.5	15,000	10,000	9,000	11.55	9.90	5.00
Oreg	18,000	17,000	17,000	3.5	3.1	3.5	63,000	52,700	59,500	9.95	10.80	6.50
U. S	1,789,000	1,076,000	885,300	1.47	1.42	1.38	2,627,300	1,523,100	1,222,100	10.28	11.78	7.15

[1] Preliminary. [2] Less than 1,000 acres.

TABLE 303.—*Clover seed (red and alsike), sweetclover seed, Lespedeza (Japan clover) seed, and alfalfa seed: Acreage, yield per acre, production, and December 1 price, by States, 1929–1931*—Continued

SWEETCLOVER SEED

State	Acreage			Average yield per acre			Production			Price per bushel received by producers Dec. 1		
	1929	1930	1931 [1]	1929	1930	1931	1929	1930	1931 [1]	1929	1930	1931
	Acres	*Acres*	*Acres*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Dolls.*	*Dolls.*	*Dolls.*
Ohio	6, 000	4, 000	5, 000	2. 5	2. 9	2. 4	15, 000	11, 600	12, 000	4. 80	4. 70	3. 50
Ind	2, 000	2, 000	2, 000	3. 0	3. 0	3. 0	6, 000	6, 000	6, 000	5. 30	4. 70	3. 80
Ill	17, 000	14, 000	13, 000	3. 5	3. 3	2. 6	59, 500	46, 200	33, 800	5. 10	4. 70	3. 80
Wis		5, 000	1, 600		4. 5	3. 7		22, 500	5, 900		4. 05	3. 70
Minn	53, 000	32, 000	41, 000	4. 5	4. 5	5. 0	238, 500	144, 000	205, 000	3. 30	3. 55	2. 00
Iowa	8, 000	10, 000	11, 000	3. 0	3. 9	4. 2	24, 000	39, 000	46, 200	4. 95	4. 00	4. 10
Mo	8, 000	2, 000	2, 000	3. 0	3. 0	3. 0	24, 000	6, 000	6, 000	4. 50	4. 00	3. 60
N. Dak	80, 500	64, 000	70, 000	4. 6	3. 8	3. 0	370, 300	243, 200	210, 000	3. 55	3. 35	2. 50
S. Dak	60, 000	43, 000	34, 000	4. 3	3. 7	2. 4	258, 000	159, 100	81, 600	3. 30	3. 10	2. 50
Nebr	18, 000	16, 200	13, 800	4. 3	4. 2	4. 4	77, 400	68, 000	60, 700	3. 10	3. 10	3. 20
Kans	14, 000	18, 000	19, 000	3. 9	3. 9	3. 7	54, 600	70, 200	70, 300	3. 40	3. 30	2. 60
Mont	5, 000	5, 000	2, 500	4. 0	3. 0	2. 0	20, 000	15, 000	5, 000	4. 30	3. 70	3. 90
Colo	4, 000	3, 500	3, 500	5. 0	5. 0	5. 0	20, 000	17, 500	17, 500	3. 55	3. 90	3. 70
U. S	275, 500	218, 700	218, 400	4. 24	3. 88	3. 48	1, 167, 300	848, 300	760, 000	3. 57	3. 49	2. 67

LESPEDEZA (JAPAN CLOVER) SEED

State	Acreage 1929	Acreage 1930	Acreage 1931 [1]	Yield 1929	Yield 1930	Yield 1931	Production 1929	Production 1930	Production 1931 [1]	Price 1929	Price 1930	Price 1931
N. C	13, 000	15, 000	21, 000	4. 25	3. 5	4. 65	55, 200	52, 500	97, 600	3. 00	2. 90	2. 75
Ky	4, 000	3, 000	6, 000	4. 0	3. 0	4. 0	16, 000	9, 000	24, 000	2. 75	2. 75	2. 30
Tenn	24, 000	18, 000	24, 000	3. 6	3. 0	4. 0	86, 400	54, 000	96, 000	2. 75	2. 75	2. 50
Miss	4, 500	2, 700	3, 500	4. 0	3. 0	4. 5	18, 000	8, 100	15, 800	3. 35	2. 75	2. 30
La	7, 000	3, 000	2, 000	3. 3	1. 5	2. 5	23, 100	4, 500	5, 000	3. 60	3. 25	2. 65
U. S	52, 500	41, 700	56, 500	3. 78	3. 07	4. 22	198, 700	128, 100	238, 400	2. 97	2. 83	2. 57

ALFALFA SEED

State	Acreage 1929	Acreage 1930	Acreage 1931 [1]	Yield 1929	Yield 1930	Yield 1931	Production 1929	Production 1930	Production 1931 [1]	Price 1929	Price 1930	Price 1931
Mich	3, 000	6, 000	12, 000	1. 4	3. 0	3. 0	4, 200	18, 000	36, 000	14. 60	9. 00	9. 00
Wis	1, 200	16, 400	18, 200	1. 5	1. 7	1. 4	1, 800	27, 900	25, 500	14. 05	13. 00	11. 70
Minn	22, 000	33, 000	33, 000	1. 5	1. 5	1. 5	33, 000	49, 500	49, 500	13. 95	12. 10	9. 00
N. Dak	26, 000	18, 200	9, 000	2. 0	1. 5	1. 4	52, 000	27, 300	12, 600	16. 80	12. 40	9. 60
S. Dak	64, 000	51, 200	25, 600	2. 1	1. 9	1. 6	134, 400	97, 300	41, 000	12. 95	11. 50	8. 50
Nebr	25, 000	21, 000	28, 000	2. 2	2. 2	2. 6	55, 000	46, 200	72, 800	11. 75	9. 50	7. 00
Kans	34, 000	57, 800	57, 800	2. 5	3. 2	2. 5	85, 000	185, 000	144, 500	11. 00	8. 40	5. 45
Okla	13, 300	14, 500	13, 100	3. 0	4. 0	3. 0	39, 900	58, 000	39, 300	10. 00	8. 25	5. 50
Tex	3, 300	2, 600	1, 900	3. 0	2. 8	2. 4	9, 900	7, 300	4, 600	9. 80	9. 60	6. 50
Mont	60, 000	66, 000	33, 000	2. 4	2. 6	1. 4	144, 000	171, 600	46, 200	11. 50	10. 10	7. 20
Idaho	30, 000	28, 000	21, 000	4. 0	5. 4	4. 5	120, 000	151, 200	94, 500	9. 20	9. 40	6. 50
Wyo	11, 500	11, 500	9, 800	2. 3	3. 7	2. 0	26, 400	42, 600	19, 600	10. 35	10. 00	7. 00
Colo	13, 000	21, 500	20, 000	4. 0	3. 0	3. 0	52, 000	64, 500	60, 000	10. 10	8. 40	6. 50
N. Mex	4, 000	2, 800	3, 100	3. 2	3. 0	3. 3	12, 800	8, 400	10, 200	10. 00	9. 00	4. 80
Ariz	14, 000	14, 000	14, 000	4. 5	5. 0	4. 0	63, 000	70, 000	56, 000	10. 10	9. 50	5. 00
Utah	58, 000	35, 000	32, 000	1. 4	1. 2	1. 8	81, 200	42, 000	57, 600	8. 70	9. 30	5. 25
Oreg	3, 000	3, 000	3, 000	3 8	3. 0	4. 0	11, 400	9, 000	12, 000	12. 00	11. 20	10. 50
Calif	16, 100	17, 400	19, 100	3. 5	4. 0	3. 7	56, 400	69, 600	70, 700	10. 20	12. 00	7. 50
U. S	401, 400	419, 900	353, 600	2. 45	2. 73	2. 41	982, 400	1, 145, 400	852, 600	11. 17	9. 88	6. 51

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary.

TABLE 304.—*Clover seed: Receipts, Chicago, 1922–23 to 1931–32*

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Total
	1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
1922–23	1, 358	1, 293	1, 479	1, 214	1, 044	629	1, 825	845	350	109	8	272	10, 426
1923–24	641	1, 681	1, 176	1, 039	630	1, 641	2, 054	1, 352	259	41	1	40	10, 555
1924–25	346	888	2, 195	1, 801	1, 500	1, 507	1, 574	765	9	27	68	328	11, 008
1925–26	393	946	2, 125	2, 603	1, 984	2, 079	2, 888	849	487	28	107	366	14, 855
1926–27	1, 107	3, 596	2, 133	1, 350	1, 695	1, 857	1, 671	546	55			64	14, 074
1927–28	575	2, 285	4, 689	1, 544	1, 557	1, 522	1, 313	848	268	40	165	168	14, 974
1928–29	958	3, 125	2, 751	1, 746	790	1, 431	1, 616	959	68	110	160	56	13, 770
1929–30	1, 225	1, 883	2, 121	1, 269	758	1, 204	1, 588	1, 112	232	102	76	360	16, 915
1930–31	985	1, 513	1, 782	705	1, 224	1, 093	1, 886	1, 916	230	84	464	471	12, 353
1931–32	1, 150	573	2, 022	1, 505									

Bureau of Agricultural Economics. Compiled from annual reports of the Chicago Board of Trade.

TABLE 305.—*Alfalfa seed: Estimated average price per bushel received by producers, United States, 1922–23 to 1931–32*

Crop year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weighted average [1]
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	7.74	8.00	7.94	8.50	9.45	9.58	9.96	10.56	10.44	10.59	10.57	10.25	9.36
1923–24	10.38	9.20	10.75	10.21	10.19	10.43	10.51	11.17	11.41	11.67	11.39	11.33	10.63
1924–25	10.99	10.74	10.39	10.16	10.33	10.52	11.05	11.72	12.73	12.00	10.99	11.41	10.62
1925–26	9.88	10.51	10.30	10.65	9.87	9.51	9.48	9.82	9.94	9.92	10.22	9.79	9.99
1926–27	9.37	9.17	8.94	9.42	9.48	10.12	10.33	10.50	11.04	10.63	10.62	10.17	9.45
1927–28	9.62	9.69	9.78	9.45	9.76	9.55	9.74	10.11	10.35	10.52	10.91	10.24	9.87
1928–29	10.38	10.25	10.71	11.96	12.69	12.67	13.19	13.84	14.19	14.69	14.91	14.68	11.37
1929–30	13.52	12.85	11.68	10.83	11.10	11.15	11.16	11.97	11.97	12.38	12.05	12.10	11.65
1930–31	11.91	11.36	10.68	10.18	9.86	9.97	10.20	9.91	9.89	9.70	9.64	9.98	10.55
1931–32	9.69	8.35	6.94	6.58	6.97	------	------	------	------	------	------	------	---------

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings.

[1] Straight crop year average until 1924. For previous data see 1930 or earlier Yearbooks.

TABLE 306.—*Clover seed, red: Estimated average price per bushel received by producers, United States, 1922–23 to 1931–32*

Crop year	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Weighted average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	8.85	9.66	10.18	10.88	11.16	11.52	11.71	11.48	11.20	10.84	10.94	10.46	10.71
1923–24	11.07	12.20	12.18	12.22	12.51	12.67	13.04	13.09	13.07	12.72	12.42	12.09	12.38
1924–25	12.15	12.80	13.42	15.31	16.17	16.95	18.19	17.40	16.82	15.48	15.67	14.86	15.35
1925–26	13.42	14.42	14.85	15.48	16.04	16.83	17.45	17.88	18.08	17.16	17.17	16.83	15.87
1926–27	16.63	17.21	17.85	17.89	19.07	20.18	21.16	22.75	22.45	22.07	20.69	17.94	19.06
1927–28	16.78	15.67	15.07	15.33	15.97	16.37	16.90	16.92	17.04	16.89	16.42	15.90	16.11
1928–29	16.26	16.49	16.68	16.81	16.96	17.37	17.54	17.96	17.90	17.62	17.17	16.30	16.99
1929–30	12.48	10.68	9.75	9.94	9.92	9.95	10.03	10.23	10.23	10.40	10.34	11.01	10.34
1930–31	11.65	12.47	12.35	11.76	11.78	11.64	11.54	11.59	11.80	11.84	10.76	10.08	11.79
1931–32	7.99	6.73	6.97	7.34	------	------	------	------	------	------	------	------	---------

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly prices obtained by weighting monthly prices by average monthly marketings. For previous data see 1930 or earlier Yearbooks.

TABLE 307.—*Timothy seed: Acreage, yield per acre, production, and December 1 price, by States, 1929–1931*

State	Acreage			Average yield per acre			Production			Price per bushel received by producers Dec. 1		
	1929	1930	1931 [1]	1929	1930	1931	1929	1930	1931 [1]	1929	1930	1931
	Acres	*Acres*	*Acres*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Dolls.*	*Dolls.*	*Dolls.*
Pa.	5,000	4,000	4,000	2.5	2.6	3.1	12,500	10,400	12,400	3.20	3.70	2.80
Ohio	29,000	13,000	26,000	3.5	3.2	4.2	101,500	41,600	109,200	2.25	3.20	1.60
Ind.	9,000	4,000	15,000	3.2	2.2	3.5	28,800	8,800	52,500	2.25	3.20	2.00
Ill.	54,000	59,000	71,000	3.0	2.9	3.4	162,000	171,100	241,400	2.20	3.10	1.70
Wis.	10,000	18,000	19,000	3.2	3.8	3.5	32,000	68,400	66,500	2.45	3.10	1.70
Minn.	40,000	44,000	44,900	4.2	4.2	3.5	168,000	184,800	157,200	2.20	2.80	1.60
Iowa	172,000	206,400	217,000	3.6	5.0	4.8	619,200	1,032,000	1,041,600	2.20	2.80	1.60
Mo.	80,000	72,000	80,000	2.9	2.8	4.4	232,000	201,600	352,000	2.20	2.50	1.60
N. Dak.	2,900	2,500	2,500	3.0	3.0	2.0	8,700	7,500	5,000	2.20	2.40	1.90
S. Dak.	4,800	5,300	3,400	2.7	2.6	2.3	13,000	13,800	7,800	1.90	2.40	2.30
U. S.	406,700	428,200	482,800	3.39	4.06	4.24	1,377,700	1,740,000	2,045,600	2.22	2.82	1.64

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Preliminary

TABLE 308.—*Timothy seed: Receipts, Chicago, 1922–23 to 1931–32*

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Total
	1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
1922–23	8, 967	9, 593	4, 577	2, 048	1, 050	570	1, 352	1, 697	1, 243	398	355	124	31, 974
1923–24	5, 386	13, 397	4, 419	1, 606	1, 329	662	1, 298	1, 815	1, 162	65	315	507	31, 961
1924–25	3, 698	12, 714	4, 845	3, 736	1, 552	2, 138	2, 038	2, 566	1, 809	1, 240	664	687	37, 687
1925–26	5, 933	7, 599	5, 009	2, 047	1, 651	2, 499	1, 801	2, 316	1, 734	1, 015	667	672	32, 943
1926–27	5, 907	7, 981	3, 368	2, 113	1, 158	1, 588	1, 780	2, 601	1, 481	980	779	516	30, 252
1927–28	6, 548	7, 387	3, 741	3, 812	961	1, 170	1, 669	1, 826	1, 625	1, 613	1, 039	896	32, 287
1928–29	1, 652	5, 664	3, 164	956	921	820	650	802	471	335	311	103	15, 849
1929–30	3, 519	3, 363	2, 026	1, 915	809	600	920	1, 229	926	901	109	168	16, 485
1930–31	7, 079	8, 999	3, 451	1, 701	825	317	862	1, 184	2, 227	142	------	------	26, 787
1931–32	13, 668	13, 771	6, 858	3, 037	2, 642	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from annual reports of the Chicago Board of Trade.

TABLE 309.—*Timothy seed: Estimated average price per bushel received by producers, United States, 1922–23 to 1931–32*

Crop year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weighted average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	2. 20	2. 28	2. 48	2. 49	2. 69	3. 06	2. 98	3. 00	2. 99	2. 87	2. 92	3. 16	2. 60
1923–24	2. 63	3. 01	3. 12	3. 15	3. 19	3. 37	3. 56	3. 60	3. 54	3. 48	3. 44	3. 23	3. 19
1924–25	3. 20	3. 12	3. 16	2. 88	3. 03	3. 04	3. 03	3. 15	3. 24	3. 10	3. 05	3. 47	3. 11
1925–26	3. 36	3. 21	3. 21	3. 31	3. 41	3. 38	3. 56	3. 51	3. 47	3. 26	3. 41	3. 36	3. 33
1926–27	2. 68	2. 55	2. 61	2. 46	2. 58	2. 62	2. 70	2. 69	2. 76	2. 69	2. 76	2. 58	2. 61
1927–28	2. 06	1. 66	1. 58	1. 61	1. 73	1. 78	1. 92	1. 86	1. 88	1. 96	2. 08	2. 07	1. 77
1928–29	1. 86	1. 91	2. 08	2. 20	2. 20	2. 41	2. 49	2. 62	2. 67	2. 65	2. 56	2. 36	2. 20
1929–30	1. 69	1. 88	2. 02	2. 17	2. 25	2. 46	2. 37	2. 51	2. 67	2. 69	2. 65	2. 53	2. 16
1930–31	2. 51	2. 62	3. 06	3. 11	3. 09	3. 29	3. 32	3. 58	3. 61	3. 43	3. 16	2. 33	3. 02
1931–32	1. 38	1. 43	1. 44	1. 46	1. 54	------	------	------	------	------	------	------	---------

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly prices obtained by weighting monthly prices by average monthly marketings. For previous data see 1930 or earlier Yearbooks.

TABLE 310.—*Seeds: Average price per 100 pounds, specified markets, 1922–1931*

Season, January–May	Alfalfa, Kansas City	Alsike clover, Chicago	Red clover, Chicago	Kentucky blue-grass, Kansas City	Timothy, Chicago	Sweet-clover, Minneapolis	Meadow fescue, Kansas City	Lespedeza, Louisville	German millet, Kansas City	Amber sorgo, Kansas City	Hairy vetch, Baltimore	Sudan grass, Kansas City
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922	17. 96	18. 21	23. 50	53. 50	6. 99	8. 53	15. 90	17. 11	2. 03	1. 94	12. 23	4. 29
1923	20. 03	16. 46	20. 93	25. 88	7. 02	12. 41	10. 00	18. 98	3. 76	4. 25	16. 81	14. 28
1924	22. 26	15. 66	20. 87	25. 09	7. 96	15. 28	10. 58	20. 78	3. 80	1. 74	10. 45	8. 22
1925	22. 84	23. 38	33. 97	28. 00	6. 79	12. 34	9. 42	19. 50	4. 98	2. 24	8. 82	5. 68
1926	20. 40	27. 55	33. 67	38. 05	7. 94	9. 65	15. 49	15. 74	3. 10	2. 72	12. 25	4. 31
1927	19. 90	37. 42	42. 54	20. 53	5. 97	13. 65	25. 00	8. 57	3. 25	3. 10	15. 10	6. 68
1928	21. 90	27. 80	30. 65	19. 72	4. 74	8. 55	14. 70	17. 65	2. 45	1. 99	9. 72	3. 62
1929	26. 04	34. 65	33. 63	31. 31	6. 54	8. 50	16. 01	20. 43	3. 44	2. 09	9. 30	5. 80
1930	24. 81	19. 90	21. 35	20. 00	8. 06	8. 00	10. 00	14. 37	3. 45	3. 47	9. 00	5. 40
1931	22. 56	23. 88	25. 04	34. 37	10. 55	9. 22	10. 76	14. 69	3. 69	2. 81	8. 45	7. 38

Bureau of Agricultural Economics. Compiled from weekly reports to the bureau from seedsmen in the various markets. These prices are the average wholesale selling prices for high-quality seed.

TABLE 311.—*Field seeds: Average wholesale price per 100 pounds at specified markets, by months, 1922–1931*

Season, January–May	Alfalfa, common, Kansas City					Alsike clover, Chicago				
	Jan.	Feb.	Mar.	Apr.	May	Jan.	Feb.	Mar.	Apr.	May
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1922	16.90	18.00	18.50	17.90	18.50	18.20	19.25	19.00	17.30	17.30
1923	19.50	19.50	19.50	20.65	21.00	16.50	16.50	16.50	16.45	16.35
1924	21.50	21.50	22.30	23.00	23.00	15.55	15.45	15.45	15.85	16.00
1925	22.00	22.10	23.10	23.50	23.50	21.75	22.35	23.05	24.75	25.00
1926	20.00	20.00	20.00	21.00	21.00	26.10	27.25	27.85	28.20	28.40
1927	19.50	20.00	20.00	20.00	20.00	36.00	37.95	39.45	38.85	34.85
1928	21.50	22.00	22.00	22.00	22.00	28.35	28.10	27.80	27.70	27.10
1929	26.00	26.00	26.20	26.00	26.00	34.65	33.90	35.15	35.45	34.15
1930	23.55	24.75	25.25	25.25	25.25	20.10	19.90	19.50	20.10	19.90
1931	22.90	22.50	22.50	22.50	22.50	23.70	24.00	23.75	23.20	22.75
	Red clover, Chicago					Sweet clover, Minneapolis				
1922	22.20	24.55	25.45	23.35	21.95	8.00	8.25	8.50	8.90	9.00
1923	22.55	22.45	20.60	19.70	19.35	12.40	12.00	12.40	13.00	12.25
1924	23.10	21.55	21.10	19.60	19.00	15.00	15.00	15.40	15.90	15.10
1925	34.20	36.00	34.30	33.35	32.00	13.00	13.00	12.75	11.95	11.00
1926	32.15	36.50	34.70	34.00	34.00	9.00	9.45	9.85	9.95	10.00
1927	38.60	42.30	45.00	44.25	42.55	14.35	14.35	14.00	13.10	12.50
1928	32.50	30.95	29.95	30.20	29.70	8.75	8.70	8.45	8.45	8.40
1929	33.00	33.20	34.40	34.35	33.20	8.50	8.50	8.50	8.50	8.50
1930	21.20	21.35	21.00	21.60	21.60	8.00	8.00	8.00	8.00	8.00
1931	26.00	26.05	25.45	24.15	23.55	9.50	9.40	9.15	9.05	9.00
	Kentucky bluegrass, Kansas City					Timothy, Chicago				
1922	50.00	52.50	55.00	55.00	55.00	7.05	7.30	7.30	6.60	6.70
1923	25.00	25.00	25.00	26.90	27.50	7.00	7.00	7.05	7.05	7.00
1924	25.10	25.35	25.00	25.00	25.00	8.15	8.25	8.10	7.75	7.55
1925	28.00	28.00	28.00	28.00	28.00	6.95	6.70	6.50	6.85	6.95
1926	40.00	39.25	37.00	37.00	37.00	8.10	8.10	7.95	7.80	7.75
1927	20.25	21.00	21.00	20.40	20.00	6.05	6.05	5.85	5.95	5.95
1928	19.50	19.50	19.60	20.00	20.00	4.75	4.55	4.35	4.75	5.30
1929	31.50	30.75	31.30	31.50	31.50	6.75	6.70	6.62	6.45	6.15
1930	20.00	20.00	20.00	20.00	20.00	7.10	7.20	7.30	8.25	10.45
1931	34.10	34.25	34.50	34.50	34.50	10.20	10.45	10.45	10.70	10.95

Bureau of Agricultural Economics. Compiled from weekly reports to the bureau from seedsmen in the various markets. These prices are the average wholesale selling price for high-quality seed.

TABLE 312.—*Forage plant seed: Imports into United States, 1921–22 to 1930–31* [1]

Kind of seed	Year beginning July									
	1921–22	1922–23	1923–24	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31
	1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
Alfalfa	7,259	8,784	12,818	4,783	4,548	5,134	782	1,146	337	233
Canada bluegrass	1,034	836	817	1,150	284	882	1,102	1,228	608	985
Awnless brome grass	14	------	------	------	11	------	(2)	5	4	4
Alsike clover	7,057	5,566	11,056	10,425	10,989	4,163	7,609	4,798	7,220	94
Crimson clover	3,443	2,262	7,745	4,834	5,766	2,385	1,346	3,395	3,099	3,079
Red clover	10,391	448	24,729	6,541	19,725	10,816	4,641	7,547	2,154	2,805
White clover	16,623	520	1,408	1,227	1,666	975	1,778	2,410	2,278	768
Biennial white sweetclover	------	------	4,039	3,493	5,879	4,130	3,379	1,464	206	------
Biennial yellow sweetclover	------	------	222	52	502	174	116	29	3	------
Clover mixtures	57	20	74	13	122	24	41	250	32	15
Grass mixtures	43	(2)	(2)	(2)	(2)	------	------	5	5	1
Meadow fescue	1	------	(2)	1	13	16	(2)	8	1	------
Broomcorn millet	1,496	5,360	595	253	456	(3)	(3)	(3)	(3)	(3)
Foxtail millet	302	65	184	243	125	------	30	108	------	------
Orchard grass	2,922	768	603	992	253	260	173	2,377	318	342
Rape	4,763	6,384	6,600	4,345	6,526	6,788	6,438	6,982	6,681	5,119
Perennial ryegrass	1,868	1,834	1,952	1,335	2,302	1,203	1,083	1,180	937	824
Italian ryegrass	828	860	1,034	831	1,683	833	456	300	244	200
Timothy	95	32	(2)	1	3	45	23	(2)	37	------
Hairy vetch	1,941	1,599	3,215	2,068	3,986	2,124	3,895	4,064	2,483	1,628
Spring vetch	345	1,858	1,210	1,266	1,603	992	563	1	821	704

Bureau of Agricultural Economics. Compiled from data of the seed laboratory, Bureau of Plant Industry.

[1] Imports of hairy vetch and sweetclover for all years are based on information furnished by U. S. Customs Service. All other figures represent imports of seed permitted entry under the Federal seed act (formerly designated the seed importation act.)
[2] Less than 500 pounds.
[3] Data not compiled.

STATISTICS OF BEEF CATTLE, HOGS, SHEEP, HORSES, MULES, AND ASSES

TABLE 313.—*All cattle and other cattle: Number on farms and value per head in the United States, 1840, 1850, 1860, 1867–1932*

Year	Cattle on farms: All cattle [1]	Other than milk cows: Number [2]	Other than milk cows: Value per head Jan. 1 [3]	Year	Cattle on farms: All cattle [1]	Other than milk cows: Number [2]	Other than milk cows: Value per head Jan. 1 [4]
	Thousands	*Thousands*	*Dollars*		*Thousands*	*Thousands*	*Dollars*
1840 [5]	*14,972*			1900 [6]	43,902	27,610	
1850 [5]	*16,078*	*9,693*		1900 [5]	*67,720*	*50,584*	
1860 [5]	*23,365*	*14,779*		1900	57,518	42,265	23.60
1867	20,080	11,731	15.79	1901	60,544	45,023	18.83
1868	20,634	11,942	15.06	1902	62,215	46,428	17.73
1869	21,433	12,185	18.73	1903	63,788	47,715	17.44
1870 [5]	*22,501*	*13,566*		1904	64,137	47,678	15.42
1870	25,484	15,388	18.87	1905	64,003	47,161	14.32
1871	26,235	16,212	20.78	1906	62,872	45,595	14.98
1872	26,694	16,390	18.12	1907	62,373	44,723	16.16
1873	26,990	16,414	18.06	1908	60,794	42,857	15.96
1874	26,923	16,218	17.55	1909	59,634	41,480	16.53
1875	27,220	16,313	16.91	1910 [5]	*61,803*	*41,178*	
1876	27,870	16,785	17.00	1910	57,940	39,734	18.02
1877	29,217	17,956	15.99	1911	56,219	37,975	19.41
1878	30,523	19,223	16.72	1912	55,022	36,710	20.03
1879	33,234	21,408	15.38	1913	55,833	37,307	24.91
1880 [5]	*34,932*	*22,489*		1914	58,737	39,807	29.42
1880	33,258	21,231	16.10	1915	62,532	43,006	31.54
1881	33,308	20,939	17.33	1916	66,394	46,330	31.69
1882	35,892	23,280	19.89	1917	69,533	48,992	33.91
1883	41,172	28,046	21.81	1918	71,229	50,208	38.63
1884	42,547	29,046	23.52	1919	70,261	49,042	41.79
1885	43,772	29,867	23.25	1920 [5]	*66,639*	*46,934*	
1886	45,510	31,275	21.17	1920	70,325	48,870	40.01
1887	48,034	33,512	19.79	1921	68,633	47,193	29.05
1888	49,234	34,378	17.79	1922	68,663	46,841	21.89
1889	50,331	35,032	17.05	1923	67,384	45,285	23.41
1890 [5]	*50,246*	*33,734*		1924	65,832	43,544	23.03
1890	52,802	36,849	15.21	1925 [5]	*60,760*	*43,115*	
1891	52,896	36,876	14.76	1925	63,115	40,610	22.57
1892	54,067	37,651	15.16	1926	59,977	37,666	26.40
1893	52,378	35,954	15.24	1927	57,528	35,369	28.12
1894	53,095	36,608	14.66	1928	56,701	34,572	36.30
1895	50,869	34,364	14.06	1929	57,878	35,548	42.93
1896	48,223	32,085	15.86	1930 [5]	*63,911*	*43,415*	
1897	46,450	30,508	16.65	1930	59,730	36,820	40.44
1898	45,105	29,264	20.92	1931	60,915	37,357	28.08
1899	43,984	27,994	22.79	1932 [7]	62,407	38,028	18.31

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revisions for the year 1920–1931 were made January, 1932.

[1] Prior to 1900 estimates for each 10-year period represent an index of annual changes applied to census as base on first report after census data were available. Figures for 1900–1919 are tentative revised estimates of the Bureau of Agricultural Economics as first published in 1927 yearbook.

[2] Obtained by subtracting the estimates of "milk cows on farms" shown in Table 386 from the estimates of "all cattle on farms" shown in this table.

[3] Series for 1867–1899 are estimates as currently reported.

[4] Data for 1900–1925 are an old series adjusted on basis average relationship between the old and new series from 1926 to 1928. Old series was weighted averages of prices by age groups only and was shown in 1928 Yearbook. The conversion factor was 0.9466 (base is old series). Data for 1926–1932 are a new series referred to above, of average values by age and sex classification weighted by numbers in each class.

[5] Italic figures for Census years represent classification of cattle as follows: 1840 reported as "neat cattle," 1880 and 1890 exclude an estimated number of unenumerated cattle on ranges as follows: 1880, 3,750,022; 1890, 6,285,220. No estimate made prior to 1880. Figures for census prior to 1900 were nominally exclusive of calves, though some calves may have been included. 1900, 1910, and 1930 include spring born calves. 1850–1890 exclude working oxen as follows: 1850, 1,700,744; 1860, 2,254,911; 1870, 1,319,371; 1880, 993,841; 1890, 1,117,494. Not separately reported after 1890. Census dates were June 1, from 1840 to 1900; Apr. 15, 1910; Jan. 1, 1920 and 1925; Apr. 1, 1930.

[6] Original estimate of the Bureau of Agricultural Economics.

[7] Preliminary.

TABLE 314.—*All cattle and calves, including cows and heifers kept for milk: Estimated number on farms and value per head, by States, January 1, 1928–1932*

State and division	Number					Value per head [1]				
	1928 [2]	1929 [2]	1930 [2]	1931 [2]	1932 [3]	1928	1929	1930	1931	1932
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Maine	225	225	232	241	243	57.90	65.40	71.70	51.20	37.20
New Hampshire	116	116	120	127	131	79.30	86.70	89.70	67.90	45.00
Vermont	404	409	415	427	436	76.70	77.30	78.70	61.30	41.00
Massachusetts	179	181	183	181	179	102.80	106.10	113.40	98.20	70.30
Rhode Island	27	28	29	29	29	109.30	114.50	121.00	98.60	71.20
Connecticut	140	142	147	153	155	109.90	111.20	113.70	88.10	67.30
New York	1,851	1,904	1,956	1,956	1,976	90.60	100.10	95.40	69.20	49.70
New Jersey	155	157	160	160	163	102.40	113.80	128.30	104.00	73.50
Pennsylvania	1,277	1,330	1,385	1,357	1,398	77.10	86.70	86.20	63.50	47.20
North Atlantic	4,374	4,492	4,627	4,631	4,710	85.04	93.13	92.38	68.96	49.70
Ohio	1,495	1,525	1,610	1,562	1,610	65.10	72.00	71.90	46.80	34.60
Indiana	1,287	1,307	1,333	1,360	1,428	59.00	67.00	66.00	42.50	30.40
Illinois	2,053	2,094	2,199	2,265	2,401	59.30	68.70	67.60	48.30	31.70
Michigan	1,313	1,335	1,391	1,376	1,390	66.50	76.00	75.10	47.70	34.80
Wisconsin	2,920	2,913	3,056	3,150	3,184	69.90	79.10	78.40	51.80	34.60
North Central, East	9,068	9,174	9,589	9,713	10,013	64.67	73.37	72.62	48.30	33.34
Minnesota	2,750	2,872	3,030	3,151	3,246	54.50	63.30	60.80	41.70	25.60
Iowa	3,758	3,858	3,983	4,063	4,185	54.30	61.90	61.30	42.40	26.60
Missouri	2,250	2,350	2,500	2,551	2,660	47.60	57.80	53.50	34.70	23.80
North Dakota	1,140	1,195	1,307	1,398	1,454	43.60	53.50	51.30	34.90	22.60
South Dakota	1,718	1,758	1,871	1,946	1,907	47.80	55.40	54.80	37.30	21.90
Nebraska	2,766	2,931	3,016	3,167	3,104	49.40	59.00	55.00	39.00	24.20
Kansas	2,670	2,854	2,991	3,141	3,392	44.20	52.40	50.20	33.40	22.00
North Central, West	17,052	17,818	18,698	19,417	19,948	49.70	58.38	56.03	38.20	24.17
North Central	26,120	26,992	28,287	29,130	29,961	54.90	63.48	61.65	41.57	27.24
Delaware	49	50	50	49	49	77.60	93.70	89.00	65.30	46.20
Maryland	266	273	277	277	277	69.90	79.50	80.70	61.10	41.20
Virginia	723	752	777	754	782	47.10	54.90	54.80	33.90	27.80
West Virginia	455	478	510	500	525	52.00	60.30	58.10	36.00	28.60
North Carolina	496	496	507	532	548	44.70	48.10	47.80	35.90	27.10
South Carolina	285	268	261	261	266	34.10	39.30	39.70	33.10	23.60
Georgia	769	736	758	773	789	27.00	31.00	31.60	23.90	16.60
Florida	488	444	432	432	441	17.60	23.40	29.70	23.70	18.00
South Atlantic	3,531	3,497	3,572	3,578	3,677	40.03	46.92	47.71	33.57	25.18
Kentucky	990	1,015	990	940	978	46.90	51.40	49.40	31.80	23.70
Tennessee	957	971	992	992	1,032	38.80	43.60	44.40	28.80	20.50
Alabama	756	756	756	771	810	27.80	32.20	33.10	22.40	15.80
Mississippi	879	863	902	929	966	25.80	30.10	32.40	20.30	14.30
Arkansas	737	728	743	773	848	29.90	34.10	33.90	19.20	16.20
Louisiana	655	684	684	705	740	23.70	31.90	30.70	22.70	18.20
Oklahoma	1,729	1,814	1,915	2,010	2,151	39.70	45.00	41.00	25.40	18.70
Texas	5,950	6,152	6,252	6,127	6,127	37.30	41.70	37.50	23.90	17.30
South Central	12,653	12,983	13,234	13,247	13,652	35.99	40.79	38.27	24.38	17.90
Montana	1,144	1,190	1,226	1,263	1,250	46.00	58.10	53.80	38.80	24.10
Idaho	588	588	606	636	668	48.60	56.70	52.10	40.70	24.60
Wyoming	771	778	790	830	863	48.90	59.10	54.30	40.30	24.50
Colorado	1,377	1,421	1,454	1,541	1,541	46.70	55.30	50.90	37.80	22.50
New Mexico	1,156	1,073	1,100	1,100	1,144	38.90	46.50	40.30	30.30	21.30
Arizona	835	715	750	795	851	40.90	49.50	46.00	33.20	22.30
Utah	475	475	461	475	484	45.60	57.50	52.70	40.30	22.70
Nevada	375	345	320	320	310	46.40	59.90	52.40	38.70	25.70
Washington	530	557	579	591	615	58.20	72.40	65.80	47.90	37.00
Oregon	702	723	757	772	795	49.50	59.90	54.70	40.70	29.80
California	2,070	2,049	1,967	2,006	1,886	53.70	64.50	63.00	51.50	33.90
Western	10,023	9,914	10,010	10,329	10,407	47.70	58.11	53.72	40.76	26.43
United States	56,701	57,878	59,730	60,915	62,407	50.81	58.77	56.69	39.31	26.64

Bureau of Agricultural Economics. Estimates of crop-reporting board. Revisions by States, 1920–1927, are published in February, 1932, Crops and Markets.

[1] Sum of total value of subgroups (classified by age and sex) divided by total number and rounded to nearest dime for States. Division and United States averages not rounded. State figures are new weighted value series not comparable to State figures previously published for the years prior to 1925.
[2] Revised, January, 1932.
[3] Preliminary.

TABLE 315.—*Cattle: Number in countries having 150,000 or over, average 1921–1925, annual 1926–1931*

Country	Month of estimate	Average 1921–1925[1]	1926	1927	1928	1929	1930	1931
		Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
North America and West Indies:								
United States	January	66, 725	59, 977	57, 528	56, 701	57, 878	59, 730	60, 915
Canada	June	9, 588	8, 571	9, 172	8, 793	8, 825	8, 937	
Mexico	do	[2] 2, 492	5, 585					
Guatemala	July	268	564	310	298	396	416	
Honduras		[3] 466						
Salvador							[4] 328	
Nicaragua		[5] 1, 200						
Costa Rica		435	423	478	443	399		
Cuba	December [6]	4, 841	3, 783	4, 704	4, 729	4, 421	4, 845	4, 377
Dominican Republic	May	640			488			
Porto Rico		279			141			
Estimated total [7]		87, 900						
South America:								
Colombia		7, 468	6, 500	6, 727			7, 343	
Venezuela		2, 689					[5] 3, 000	
British Guiana		117	138	141	154	154	154	
Ecuador		[5] 1, 500	1, 280			[5] 1, 285		
Peru	February	1, 198					[4] 1, 806	
Bolivia		2, 145	2, 320	1, 404		1, 855		
Chile		1, 957					[4] 2, 388	
Brazil [8]	September	[4,9] 34, 271					[5] 40, 000	
Uruguay		[4] 8, 432					[4] 7, 128	
Paraguay	December [6]	4, 600						
Argentina	do	[4] 37, 065					[4,10] 32, 212	
Estimated total [7]		101, 500						
Europe:								
England and Wales	June	5, 824	6, 253	6, 275	6, 026	5, 958	5, 850	6, 064
Isle of Man	do	19	19	19	19	20	20	
Scotland	do	1, 171	1, 198	1, 210	1, 214	1, 233	1, 233	1, 208
Northern Ireland	do	748	667	697	738	700	673	680
Irish Free State	do	4, 266	3, 947	4, 047	4, 125	4, 137	4, 038	4, 029
Norway [11]	do	1, 128	1, 200	1, 209	1, 221	1, 224	1, 251	1, 310
Sweden	do	2, 418		[4] 2, 898			3, 060	
Denmark	July	2, 613	2, 838	2, 913	3, 016	3, 036	3, 057	3, 197
Netherlands	(May–June) [4]	2, 063					[4] 2, 366	
Belgium	December [6]	1, 550	1, 655	1, 712	1, 739	1, 751	1, 738	1, 759
France	do	13, 582	14, 373	14, 482	14, 941	15, 005	15, 631	15, 467
Spain	do	3, 457	3, 794	3, 688		[4] 3, 660		
Portugal		754						
Italy [8]	(March–April)	6, 812	[5] 7, 400				[4] 6, 902	
Switzerland	April [4]	1, 425	[4] 1, 587					[4] 1, 609
Germany	December [6]	16, 786	17, 202	17, 221	18, 011	18, 414	18, 033	18, 431
Austria	(December–April)	2, 241					[4] 2, 313	
Czechoslovakia	December [6]	4, 337	4, 690					4, 458
Hungary	April	1, 866	1, 847	1, 805	1, 812	1, 819	1, 785	1, 814
Yugoslavia [8]	January	4, 122	3, 738	3, 760	3, 686	3, 765		3, 850
Greece [8]	December [6]	742	890	964	947	955	874	
Bulgaria [8]	do	1, 928		2, 266				
Rumania [8]	do	5, 570	5, 219	4, 992	4, 537	4, 442	4, 355	4, 011
Poland	November	8, 063		8, 602		9, 057	9, 400	9, 782
Lithuania		1, 149	1, 396	1, 128	1, 199	1, 160	1, 170	
Latvia	June	867	955	967	961	[5] 978	1, 026	1, 117
Estonia	July	508	599	634	651	604	627	
Finland	September	1, 847	1, 860	1, 872	1, 917	1, 903		
Russia, European and Asiatic [12]	Summer	58, 263	63, 025	68, 158	70, 700	67, 200	53, 800	
Estimated total excluding Russia [7]		98, 000						
Africa:								
Abyssinia (Ethiopia)		(4, 000)			4, 000			
Morocco		1, 711	1, 933	1, 865	1, 814	2, 151	2, 092	
Algeria	September	853	946	849	887	897	939	
Tunis	December [6]	459	370	468	501	484	498	
French West Africa		2, 165	2, 329	2, 402	2, 529	[4] 2, 844	2, 825	
French Sudan		1, 086	910	1, 030	909	[4] 1, 139	1, 100	
Nigeria, including British Cameroon		2, 909	3, 162	2, 997	3, 095	3, 083	2, 973	
Egypt [8]	September	1, 310	1, 485	1, 497	1, 580	1, 623	1, 572	
Anglo-Egyptian Sudan		864	1, 500	1, 501	1, 503	1, 565	1, 300	
Italian Somaliland	February	[4,9] 1, 246			[4] 1, 106	1, 112	1, 113	
Eritrea		553		748	[4] 799			
Kenya Colony	March–June	3, 038	3, 413	3, 476	3, 482	3, 498	5, 193	
Uganda	December [6]	1, 109	1, 342	1, 338	1, 733	1, 710	1, 911	
French Equatorial Africa		315	881					
Belgian Congo		195	465	495	485	256	197	

See footnotes at end of table.

TABLE 315.—*Cattle: Number in countries having 150,000 or over, average 1921–1925, annual 1926–1931*—Continued

Country	Month of estimate	Average 1921–1925[1]	1926	1927	1928	1929	1930	1931
		Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
Africa—Continued.								
Ruanda-Urundi		700	750	771	800	820	1,000	
Angola-Portuguese West Africa		524	742	1,053	1,074	1,423		
Mozambique (Portuguese East Africa)		342	389	412	462	479	491	
British Southwest Africa		561	621	585	655	698	655	
Bechuanaland		482	518	598	625			
Union of South Africa	April–May	9,459	10,514	10,590	10,650	[13] 10,695		
Basutoland		604	645	659	650	664	649	
Rhodesia—								
Northern	December [6]	289	382	363	416	441	473	
Southern	do	1,794	2,102	2,189	2,327	2,326	2,468	
Swaziland	do	244	185	300	350	367	380	
Tanganyika Territory		3,806	4,479	4,706	4,895	4,867	5,170	
Madagascar	February	7,708		7,362	6,901	6,841	7,048	
Estimated total [7]		50,000						
Asia:								
Turkey, European and Asiatic [8]		4,821	5,572	5,772	5,559	5,215	5,343	
Persia		[5] 1,000						
Syria and Lebanon		257	243	312	318	332	391	
India— [8]								
British	December–April	146,759	150,832	151,288	151,146	151,339	154,629	
Native States	do	33,982	33,276	34,643	33,409	33,671	[4] 43,207	
Ceylon [8]	December [6]	1,459	1,457	1,537	1,588	1,618	1,650	
China, including Turkestan and Manchuria		22,000						
Japan	December [6]	1,440	1,460	1,465	1,474	1,484	1,488	
Chosen [8]	do	1,567	1,591	1,595	1,586	1,570	1,586	1,612
Taiwan [8]	do	407	379	381	386	388	390	
French Indo-China [8]		3,474	[14] 3,960	[14] 3,778	[14] 3,896	[14] 3,926	3,700	
Siam [8]	March	6,701	8,230	8,495	8,657	9,379	9,153	
Philippine Islands [8]	December [6]	2,393	2,622	2,846	2,958	3,064		
Dutch East Indies—								
Java and Madura [8]	do	5,287	5,721	5,680	5,781	5,658	5,700	5,768
Outer Possessions [8]	do	1,872	1,965	1,952	1,981	2,022	2,049	2,064
Estimated total, excluding Russia [7]		235,200						
Oceania:								
Australia	December [6]	13,789	13,280	11,963	11,617	11,301	11,202	
New Zealand	January	3,393	3,452	3,258	3,274	3,446	3,766	
Estimated total [7]		17,400						
Total countries reporting all periods, including Russia—								
To 1930 (55) [15]		447,738	455,142	460,310	462,277	461,511	465,383	
To 1931 (17) [15] [16]		136,263	130,391	128,989	129,119	130,246	132,580	133,823
Estimated world total, including Russia [7]		648,300						

Bureau of Agricultural Economics. Compiled from official sources and the International Institute of Agriculture unless otherwise stated. Figures in parenthesis interpolated.

[1] Average for 5-year period if available; otherwise, for any year or years within this period except as otherwise stated.
[2] Incomplete.
[3] Year 1918.
[4] Census.
[5] Unofficial.
[6] Countries reporting as of December have been considered as of Jan. 1 of the following year; i. e., figures for number of cattle in France as of Dec. 31, 1925, have been put in the 1926 column, etc.
[7] This total includes interpolations for a few countries not reporting each year and rough estimates for some others.
[8] Buffaloes included.
[9] Year 1920.
[10] June, 1930.
[11] In rural communities only.
[12] Years 1924–1926, from Statistical Review, October, 1928, p. 6; year 1927, Agricultural Statistics of the U. S. S. R., Lenin Academy, 1927–1930—Planned Economy No. 12, 1930, State Planning Board.
[13] Number in towns assumed to be same as in 1927; i. e., 177,000 and added in for purposes of comparison with preceding years.
[14] Including 1925 estimate of 1,324,500 cattle and buffaloes in order to compare with preceding estimates.
[15] Comparable totals for number of countries indicated.
[16] Excluding Russia as figures are not available for 1931.

TABLE 316.—*Cattle and calves: Receipts and stocker and feeder shipments at all public stockyards, 1922–1931*

RECEIPTS, CATTLE

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
1922	1,222	1,044	1,145	1,009	1,358	1,217	1,255	1,608	1,802	2,243	1,846	1,392	17,141
1923	1,395	1,038	1,044	1,159	1,305	1,138	1,357	1,622	1,782	2,141	1,650	1,368	16,909
1924	1,388	1,041	1,084	1,161	1,317	1,172	1,254	1,398	1,938	2,096	1,796	1,528	17,173
1925	1,353	1,056	1,273	1,201	1,139	1,160	1,398	1,632	1,592	2,126	1,717	1,470	17,117
1926	1,314	1,065	1,233	1,146	1,277	1,279	1,279	1,421	1,827	2,030	1,836	1,327	17,034
1927	1,327	1,080	1,172	1,107	1,348	1,185	1,089	1,494	1,482	2,008	1,749	1,217	16,258
1928	1,272	1,045	966	1,119	1,188	1,057	1,158	1,308	1,669	1,913	1,419	1,075	15,189
1929	1,160	814	953	1,146	1,097	977	1,166	1,156	1,572	1,787	1,405	1,104	14,337
1930	1,155	908	1,045	1,066	984	996	1,012	1,062	1,512	1,677	1,180	1,202	13,799
1931	1,040	878	1,017	1,057	1,027	1,017	1,035	1,302	1,279	1,531	1,312	991	13,486

RECEIPTS, CALVES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1922	406	372	477	461	520	542	456	541	595	693	581	433	6,077
1923	482	389	458	511	595	492	546	592	512	661	532	442	6,212
1924	500	415	472	590	574	502	544	536	628	640	567	555	6,523
1925	516	473	588	626	597	586	572	612	566	663	565	586	6,950
1926	526	486	578	564	616	592	541	576	570	644	625	519	6,837
1927	504	476	571	567	607	547	457	571	507	627	598	473	6,505
1928	499	471	499	566	610	501	492	521	522	629	544	435	6,289
1929	479	381	497	606	563	475	499	463	531	620	538	451	6,103
1930	484	418	502	578	533	464	499	543	596	700	517	534	6,368
1931	468	425	518	560	524	522	453	519	518	606	554	462	6,129

STOCKER AND FEEDER SHIPMENTS, CATTLE

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1922	223	234	266	223	338	243	216	453	595	792	630	331	4,544
1923	262	199	186	221	288	220	212	459	608	734	577	338	4,304
1924	231	165	167	230	267	191	161	293	556	724	497	288	3,770
1925	194	163	213	254	198	143	234	347	409	681	449	308	3,593
1926	207	164	171	190	201	158	188	240	495	648	521	273	3,456
1927	187	162	182	184	215	157	128	252	384	626	548	278	3,303
1928	215	175	154	236	263	165	175	312	525	704	420	218	3,562
1929	159	106	146	266	266	157	159	246	394	673	459	219	3,250
1930	201	173	176	219	172	108	99	130	368	570	375	267	2,858
1931	189	130	126	156	135	100	108	231	340	405	384	207	2,601

STOCKER AND FEEDER SHIPMENTS, CALVES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1922	10	9	16	11	21	17	7	16	35	72	80	26	320
1923	19	12	13	11	12	14	11	21	23	51	47	15	249
1924	11	5	8	9	8	10	9	13	24	39	51	21	208
1925	12	13	17	17	18	11	9	13	18	37	40	25	230
1926	18	13	13	13	17	11	11	12	26	45	49	28	256
1927	18	13	18	19	20	12	10	19	22	49	67	41	306
1928	18	19	19	18	21	19	21	24	37	94	76	35	403
1929	19	12	16	26	28	19	14	20	29	85	97	37	401
1930	32	28	30	36	28	21	10	20	75	121	103	64	568
1931	33	18	20	19	18	12	16	30	41	86	103	38	434

Bureau of Agricultural Economics. Compiled from data of the livestock and meat reporting service of the bureau. Earlier data in 1930 Yearbook, p. 829, Table 353.

TABLE 317.—*Cattle and calves: Receipts at principal public stockyards and at all public stockyards, 1922–1931*

CATTLE

Year	Chicago	Denver	East St. Louis	Fort Worth	Kansas City	Omaha	St. Joseph	South St. Paul	Sioux City	Total 9 markets [1]	All other stockyards reporting	Total all stockyards reporting [1]
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
1922	3,163	587	1,026	760	2,443	1,612	554	930	691	11,766	5,375	17,141
1923	3,157	561	1,041	947	2,632	1,685	608	839	714	12,183	4,816	16,999
1924	3,203	572	1,034	1,049	2,471	1,759	602	790	798	12,278	4,895	17,173
1925	3,023	527	1,038	1,060	2,409	1,593	609	995	845	12,098	5,019	17,117
1926	3,257	473	1,074	944	2,183	1,692	563	1,180	885	12,251	4,783	17,034
1927	2,872	577	1,004	956	2,070	1,463	541	955	747	11,186	5,072	16,258
1928	2,505	590	900	886	1,859	1,423	511	917	750	10,342	4,847	15,189
1929	2,388	556	832	762	1,836	1,444	500	879	778	9,974	4,363	14,337
1930	2,239	505	820	638	1,802	1,485	459	779	774	9,501	4,298	13,799
1931	2,287	440	792	598	1,665	1,570	433	811	769	9,364	4,122	13,486

CALVES

Year	Chicago	Denver	East St. Louis	Fort Worth	Kansas City	Omaha	St. Joseph	South St. Paul	Sioux City	Total 9 markets [1]	All other stockyards reporting	Total all stockyards reporting [1]
1922	771	70	375	324	540	132	100	457	56	2,825	3,252	6,077
1923	761	59	358	311	576	108	101	510	45	2,829	3,383	6,212
1924	794	59	350	343	572	104	117	534	38	2,910	3,613	6,523
1925	848	60	406	310	549	116	125	641	52	3,108	3,842	6,950
1926	755	56	452	241	433	123	116	730	84	2,991	3,846	6,837
1927	710	63	444	330	400	98	99	627	62	2,834	3,671	6,505
1928	762	77	415	325	351	94	87	573	63	2,746	3,543	6,289
1929	672	68	391	327	342	102	89	546	61	2,601	3,502	6,103
1930	557	88	383	331	364	120	100	559	82	2,586	3,782	6,368
1931	547	64	379	243	292	120	76	603	82	2,406	3,723	6,129

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-reporting service of the bureau. Receipts, 1900–1921, are available in 1924 Yearbook, p. 840, Table 435.

[1] Rounded totals of the complete figures.

TABLE 318.—*Beef cattle and veal calves: Estimated average price per 100 pounds received by producers in the United States, 1922–1931*

BEEF CATTLE

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weighted average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922	4.75	5.07	5.46	5.53	5.70	5.84	5.76	5.51	5.44	5.48	5.29	5.28	5.43
1923	5.51	5.55	5.62	5.78	5.77	5.82	5.72	5.60	5.70	5.48	5.23	5.26	5.57
1924	5.38	5.47	5.63	5.82	5.94	5.79	5.65	5.67	5.53	5.52	5.43	5.35	5.59
1925	5.63	5.69	6.18	6.55	6.48	6.46	6.55	6.58	6.27	6.29	6.14	6.18	6.26
1926	6.31	6.42	6.65	6.66	6.57	6.56	6.46	6.29	6.48	6.43	6.32	6.42	6.46
1927	6.45	6.60	6.82	7.13	7.17	7.08	7.13	7.21	7.42	7.55	8.00	8.32	7.54
1928	8.48	8.72	8.81	8.92	9.09	9.10	9.19	9.51	9.96	9.63	9.27	8.94	9.18
1929	8.97	8.89	9.16	9.53	9.72	9.72	9.80	9.62	9.22	8.92	8.63	8.48	9.20
1930	8.69	8.68	8.77	8.65	8.36	8.20	7.12	6.26	6.61	6.54	6.41	6.37	7.43
1931	6.41	6.03	6.03	6.00	5.67	5.26	5.16	5.09	5.00	4.76	4.81	4.38	5.31

VEAL CALVES

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weighted average
1922	7.23	7.84	7.85	7.26	7.28	7.67	7.49	7.67	8.10	8.17	7.92	7.78	7.68
1923	8.05	8.37	8.20	7.78	7.69	7.66	8.00	8.00	8.34	8.37	7.85	7.75	7.99
1924	8.36	8.51	8.43	8.33	8.14	7.91	7.88	7.94	8.09	8.22	7.89	7.84	8.12
1925	8.50	8.87	9.21	8.80	8.35	8.18	8.65	8.80	9.07	9.52	9.16	9.17	8.85
1926	9.44	9.86	9.75	9.45	8.92	9.65	9.47	9.54	10.06	10.29	9.54	9.44	9.61
1927	9.75	10.10	10.10	9.90	9.37	9.46	9.82	10.37	10.78	11.04	10.67	10.71	10.16
1928	10.88	11.30	11.34	11.18	11.18	11.56	11.87	12.32	13.05	12.62	11.99	11.82	11.79
1929	12.20	12.17	12.51	12.10	12.11	12.06	12.40	12.39	12.52	12.16	11.80	11.69	12.18
1930	11.84	11.69	11.24	10.73	9.68	9.83	9.19	8.78	9.20	9.30	8.84	8.48	9.83
1931	8.61	8.20	7.66	7.38	7.15	6.81	6.66	6.75	6.95	6.58	6.02	5.59	7.00

Bureau of Agricultural Economics. Based on reports of special price reporters. Monthly prices of beef cattle, by States, weighted by number of cattle Jan. 1 to obtain a price for the United States; monthly prices of veal calves, by States, weighted by number of milk cows Jan. 1 to obtain a price for the United States; yearly price obtained by weighting monthly prices by receipts at principal markets.

TABLE 319.—*Feeder cattle, inspected: Shipments from public stockyards, 1922–1931*

Origin and destination	Calendar year									
	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
Market origin:										
Chicago, Ill	332	275	246	230	245	167	171	157	132	173
Denver, Colo	344	347	346	281	288	328	403	334	327	228
East St. Louis, Ill	184	170	136	113	110	97	90	99	86	95
Fort Worth, Tex	209	162	160	196	233	273	285	237	190	153
Indianapolis, Ind	44	59	49	55	44	29	31	27	27	25
Kansas City, Kans	1,106	1,138	901	825	706	671	684	680	650	635
Louisville, Ky	42	33	21	27	19	34	24	17	10	7
Oklahoma City, Okla	91	77	56	78	69	89	80	85	70	64
Omaha, Nebr	566	545	476	390	379	329	355	398	405	385
Sioux City, Iowa	289	281	249	247	300	237	274	286	282	229
South St. Joseph, Mo	104	97	85	71	56	51	60	61	90	88
South St. Paul, Minn	306	223	173	208	291	203	198	209	153	138
Wichita, Kans	198	198	193	200	152	198	205	164	217	173
All other inspected	224	194	185	177	195	268	344	326	312	301
Total	4,039	3,799	3,276	3,098	3,087	2,974	3,204	3,080	2,951	2,694
State destination:										
Colorado	126	159	166	131	169	180	210	184	156	113
Illinois	546	500	439	437	435	290	310	313	275	321
Indiana	151	149	137	150	167	136	113	106	94	132
Iowa	841	742	570	487	577	431	499	538	506	483
Kansas	511	511	473	468	378	423	478	463	454	351
Kentucky	54	49	25	41	43	86	59	46	24	27
Michigan	50	46	47	49	41	36	41	34	21	24
Minnesota	18	22	31	36	32	25	29	42	41	28
Missouri	395	418	285	277	255	267	229	203	192	218
Nebraska	659	648	565	427	374	386	474	447	561	419
Ohio	123	113	90	97	102	93	70	83	52	93
Oklahoma	151	115	108	168	159	170	143	155	128	103
Pennsylvania	41	27	24	31	30	31	70	44	37	39
South Dakota	63	70	57	38	32	50	64	75	91	45
Texas	111	95	128	116	151	160	196	155	123	98
Wisconsin	30	23	23	26	29	12	12	20	14	11
All other	169	112	108	119	113	198	207	172	182	189
Total [1]	4,039	3,799	3,276	3,098	3,087	2,974	3,204	3,080	2,951	2,694

Bureau of Agricultural Economics. Compiled from Bureau of Animal Industry inspection records.

[1] Includes 2 head shipped to Alaska in 1925 and 10 head in 1926.

TABLE 320.—*Cattle, choice steers for chilled beef: Average price per 100 pounds, by months, Buenos Aires, 1909–1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922	4.68	4.53	3.97	3.30	3.31	3.90	4.41	4.50	4.24	3.84	3.30	3.25	3.94
1923	3.08	3.25	3.82	4.06	3.83	3.56	3.62	3.36	3.82	4.10	3.48	3.23	3.60
1924	3.19	3.40	3.61	3.50	3.56	3.76	4.51	4.93	5.15	5.95	5.62	5.42	4.38
1925	5.54	5.54	6.20	6.20	6.51	6.48	6.54	6.72	6.91	6.25	5.66	5.32	6.16
1926	5.40	5.42	5.27	5.39	5.52	5.24	5.58	5.70	5.45	4.63	4.06	4.21	5.16
1927	4.21	4.73	4.63	5.03	4.81	5.15	5.95	6.55	6.84	7.13	6.34	5.81	5.52
1928	6.11	5.86	6.21	6.33	6.65	6.99	6.79	6.60	6.67	6.38	5.61	5.32	6.29
1929	5.83	5.89	5.87	5.76	5.93	5.98	6.07	6.07	6.06	6.68	6.19	5.85	6.02
1930	5.80	5.35	5.39	5.74	5.57	5.44	5.27	5.27	5.22	4.91	4.52	3.76	5.19
1931	3.37	3.75	4.21	4.10	3.87	3.74	3.54	3.58	3.31	2.64	2.54	2.45	3.42

Bureau of Agricultural Economics. Calculated from quotations in the Review of the River Plate. Prices prior to May, 1924, originally quoted on basis of price per head supplemented by price per pound of dressed carcass weight. Calculations assume average dressed weight of 730 pounds or live weight of 1,259 pounds. Live-weight quotations per pound from May, 1924. Converted at average monthly rate of exchange as given in Federal Reserve Bulletins.

TABLE 321.—*Cattle and calves: Average price per 100 pounds, Chicago, by months, beef steers, 1909–1931; veal calves, 1922–1931*

BEEF STEERS [1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1909	6.00	5.85	6.10	6.10	6.45	6.45	6.45	6.70	6.75	6.60	6.45	6.20	6.35
1910	6.20	6.35	7.35	7.55	7.50	7.50	7.10	6.85	6.80	6.60	6.20	6.00	6.80
1911	6.15	6.15	6.20	6.10	5.95	6.05	6.30	6.95	6.80	6.75	6.70	6.65	6.40
1912	6.85	6.60	7.20	7.65	7.95	8.00	7.90	8.50	8.15	7.90	8.10	7.85	7.75
1913	7.80	8.25	8.30	8.15	8.00	8.15	8.25	8.30	8.50	8.40	8.25	8.20	8.25
1914	8.45	8.30	8.35	8.50	8.40	8.60	8.80	9.10	9.35	9.05	8.60	8.35	8.65
1915	8.05	7.50	7.65	7.70	8.35	8.80	9.20	9.05	8.95	8.80	8.70	8.45	8.40
1916	8.35	8.35	8.75	9.10	9.50	9.85	9.25	9.45	9.40	9.75	10.15	10.00	9.50
1917	10.15	10.50	11.25	11.75	11.90	12.15	12.35	12.70	13.10	11.70	11.10	11.40	11.60
1918	12.10	12.00	12.60	14.70	15.40	15.85	16.05	15.75	16.00	14.80	15.05	14.90	14.65
1919	15.80	15.95	16.05	15.85	15.00	13.55	15.60	16.45	15.50	16.15	15.10	14.35	15.50
1920	13.95	13.05	13.10	12.30	12.25	14.95	15.00	14.85	15.05	14.20	12.00	10.10	13.30
1921	8.70	8.20	9.05	8.15	8.25	8.00	8.10	8.50	8.00	8.10	7.40	7.00	8.20
1922	7.23	7.62	7.87	7.90	8.21	8.76	9.42	9.52	9.84	10.23	9.16	8.76	8.65
1923	8.88	8.62	8.70	8.81	9.28	9.74	9.71	10.36	10.18	9.94	9.46	8.96	9.40
1924	8.99	8.81	9.17	9.52	9.59	9.28	9.31	9.53	9.52	9.57	8.90	8.71	9.24
1925	8.97	9.15	9.93	9.99	9.90	10.34	11.28	11.10	11.04	10.80	10.16	9.72	10.16
1926	9.48	9.42	9.42	9.11	9.07	9.51	9.44	9.30	10.00	10.00	9.48	9.43	9.47
1927	9.70	9.81	10.20	10.51	10.68	11.12	11.78	12.02	12.63	13.43	13.57	13.08	11.36
1928	13.67	13.15	12.83	13.01	13.19	13.86	15.11	15.30	15.91	14.61	13.84	12.86	13.91
1929	12.51	11.92	12.68	13.52	13.67	14.10	14.59	14.22	13.92	13.81	13.00	12.74	13.43
1930	12.62	12.46	12.33	11.88	11.15	10.59	9.42	9.48	10.95	10.64	10.47	10.17	10.95
1931	9.43	8.36	8.40	7.82	7.30	7.43	7.62	8.53	8.29	8.38	8.53	7.11	8.06

VEAL CALVES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
1922	8.36	9.16	8.26	6.97	8.46	8.89	8.90	10.88	11.92	9.65	8.91	9.42	9.15
1923	10.08	10.63	9.32	8.68	9.51	9.31	10.14	10.36	10.57	9.82	8.15	9.31	9.66
1924	11.08	10.54	9.75	9.03	9.30	8.74	9.48	10.63	10.72	10.10	9.02	9.97	9.86
1925	10.72	11.94	11.24	9.49	9.42	9.56	10.91	11.94	12.18	11.19	10.60	11.30	10.87
1926	12.18	12.43	12.06	9.91	11.04	11.09	11.38	12.46	12.59	11.80	11.09	11.31	11.61
1927	12.20	12.40	11.54	10.90	11.07	11.68	13.32	14.75	15.94	14.42	13.48	13.09	12.90
1928	13.70	15.04	13.75	13.02	13.95	13.24	14.84	16.68	17.36	14.94	14.22	13.94	14.56
1929	15.83	14.74	15.50	14.43	13.39	14.22	15.30	15.81	16.64	13.76	13.70	13.82	14.76
1930	14.80	12.66	11.96	10.55	11.36	11.03	11.37	11.98	11.83	11.33	9.53	9.77	11.51
1931	10.62	9.26	7.98	8.12	8.35	8.48	7.81	9.32	9.28	7.75	6.56	6.40	8.33

Bureau of Agricultural Economics. Beef-steer prices prior to 1922 from Chicago Drovers Journal Yearbook, general average native beef cattle. Subsequent figures are the weighted average price of all grades of beef steers sold out of first hands at Chicago. Veal-calf prices from the livestock and meat reporting service of the bureau on medium to choice grades prior to July 1, 1927, and subsequent prices on good and choice grades.

[1] Western steers not included.

TABLE 322.—*Cattle and calves: Slaughter in specified countries, annual 1921–1931*

Year	United States, Federal inspected	Canada, total	Argentina, including chilling, freezing, salting, and canned-meat works [1]	Uruguay, excluding farm [2]	Australia, total	New Zealand, total [3]
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
1921	11,416	2,017	1,550	717	1,649	304
1922	12,860	1,899	2,231	1,109	1,907	398
1923	13,663	1,850	3,338	1,393	2,049	485
1924	14,528	1,864	4,321	1,173	2,505	573
1925	15,206	1,921	3,871	1,233	2,434	550
1926	15,333	1,902	3,510	1,293	2,160	519
1927	14,396	1,993	3,723	1,239	2,189	636
1928	13,147	1,949	3,189	1,272	2,200	806
1929	12,813	1,953	3,024	1,222	[4] 1,947	811
1930	12,765	[5] 1,904	2,930	1,285	([4])	886
1931	12,824	([5])	2,453	----------	([4])	----------

Bureau of Agricultural Economics. Compiled from official sources and cabled reports from agricultural representatives abroad.

[1] Including municipal and private slaughterhouses, the figures were as follows in thousands—averages 1921-1925, 5,961; 1926-1930, 6,389. The numbers killed in freezing and chilling plants alone were as follows in thousands—1925, 3,342; 1926, 3,067; 1927, 3,224; 1928, 2,830; 1929, 2,792; 1930, 2,679; 1931, 2,297.

[2] Slaughtering in freezing and chilling plants alone were as follows in thousands—1925, 651; 1926, 714; 1927, 695; 1928, 697; 1929, 853; 1930, 1,108; 1931, 901.

[3] For years ended Mar. 31, following.

[4] Slaughter for export, only, was 425,000 in 1931 compared with 429,000 in 1930 and 471,000 in 1929.

[5] Inspected slaughter, only, was 963,000 in 1931 compared with 897,000 in 1930.

TABLE 323.—*Cattle and calves: Average price per 100 pounds, at Chicago and Kansas City, by months, July, 1930–December, 1931*

CHICAGO

Year and month	Slaughter cattle											Vealers (milk-fed)		Feeder steers, all weights	
	Beef steers							Heifers (550-850 pounds)		Cows					
	900-1,100 pounds				1,100-1,300 pounds		1,300-1,500 pounds, Choice								
	Choice	Good	Medium	Common	Choice	Good		Choice	Good	Good	Common and Medium	Good and choice	Medium	Good and Choice	Common and Medium
1930															
July	$11.04	$10.00	$8.78	$6.96	$11.04	$9.95	$10.94	$10.32	$9.55	$6.83	$5.37	$11.37	$10.00	$8.12	$6.42
August	10.95	10.01	8.90	6.98	10.73	9.93	10.62	10.81	9.92	6.22	4.99	11.98	10.29	7.36	5.96
September	12.28	11.17	9.56	7.56	12.06	10.67	11.77	12.17	10.86	6.00	4.61	11.83	9.89	7.91	6.22
October	12.66	11.24	9.35	7.19	11.94	10.39	11.60	12.38	11.03	6.16	4.76	11.33	9.16	8.00	6.14
November	13.12	11.62	9.36	7.32	12.54	10.97	11.83	12.29	10.53	5.80	4.54	9.53	7.40	8.10	6.34
December	13.48	11.51	9.18	7.15	13.19	11.26	12.69	11.84	9.89	5.73	4.58	9.77	7.72	8.00	6.30
Average, 6 months	12.26	10.92	9.19	7.19	11.92	10.53	11.58	11.64	10.30	6.12	4.81	10.97	9.08	7.92	6.24
1931															
January	13.42	11.34	8.78	7.06	13.42	11.31	13.00	10.68	8.74	5.58	4.57	10.62	8.61	8.04	6.29
February	11.32	9.76	7.97	6.66	11.43	9.92	11.40	9.03	7.63	4.98	4.04	9.26	7.65	7.65	5.95
March	10.76	9.54	8.11	6.94	10.68	9.58	10.75	9.12	8.07	5.39	4.56	7.98	6.42	7.80	6.20
April	9.77	8.74	7.63	6.54	9.71	8.72	9.69	8.35	7.39	5.26	4.78	8.12	6.62	7.59	6.24
May	8.59	7.78	7.09	6.13	8.49	7.69	8.44	7.75	6.99	5.03	4.46	8.35	7.08	7.30	6.03
June	8.43	7.76	7.05	6.15	8.23	7.46	7.94	8.09	7.39	4.78	4.06	8.48	7.04	6.70	5.51
July	8.59	7.89	6.90	5.81	8.15	7.36	7.84	8.28	7.46	4.62	3.73	7.81	6.49	6.38	4.97
August	9.75	8.86	7.31	5.50	9.47	8.54	9.34	9.35	8.11	4.82	3.50	9.32	7.52	6.44	4.86
September	9.73	8.55	6.81	5.02	9.72	8.53	9.64	9.33	8.10	4.61	3.42	9.28	7.57	6.08	4.46
October	10.33	8.93	6.90	4.95	10.42	8.94	10.42	9.77	8.00	4.32	3.51	7.75	6.58	5.96	4.38
November	11.62	9.64	7.02	5.06	11.95	9.78	11.98	9.99	8.02	4.13	3.46	6.56	5.06	6.17	4.44
December	10.98	8.87	6.29	4.38	11.48	9.23	11.60	8.18	6.74	3.79	3.03	6.40	4.93	5.43	3.96
Average	10.27	8.97	7.32	5.85	10.26	8.92	10.17	8.99	7.72	4.78	3.93	8.33	6.80	6.80	5.28

TABLE 323.—*Cattle and calves: Average price per 100 pounds, at Chicago and Kansas City, by months, July, 1930–December, 1931*—Continued

KANSAS CITY

Year and month	Slaughter cattle											Feeder steers			
	Beef steers							Heifers, 550–850 pounds		Cows		500–800 pounds		800–1,050 pounds	
	900–1,100 pounds				1,100–1,300 pounds		1,300–1,500 pounds Choice								
	Choice	Good	Medium	Common	Choice	Good		Choice	Good	Good	Common and Medium	Good and Choice	Common and Medium	Good and Choice	Common and Medium
1930															
July	$10.46	$9.37	$7.93	$6.28	$10.34	$9.27	$10.29	$10.13	$9.26	$6.27	$5.00	$8.36	$5.87	$8.16	$6.21
August	10.18	9.20	7.44	5.72	10.06	8.91	9.95	10.14	9.14	5.82	4.60	7.46	5.24	7.24	5.52
September	11.91	10.37	8.29	6.22	11.60	10.20	11.35	11.37	10.30	5.79	4.57	7.56	5.07	7.62	5.62
October	11.96	10.45	8.08	5.81	11.03	9.91	10.63	11.80	10.36	5.55	4.41	7.65	5.17	7.35	5.44
November	12.35	10.70	8.33	5.86	11.12	9.93	10.56	11.72	10.06	5.58	4.42	8.03	5.44	7.71	5.63
December	12.77	10.85	8.17	6.13	12.11	10.52	11.64	11.22	9.15	5.77	4.65	8.00	5.50	7.75	5.62
Average, 6 months	11.60	10.16	8.04	6.00	11.04	9.79	10.74	11.06	9.71	5.80	4.61	7.84	5.38	7.64	5.67
1931															
January	12.58	10.45	7.75	6.03	12.13	10.31	11.75	10.49	8.53	5.44	4.48	7.90	5.38	7.66	5.58
February	10.79	8.92	7.01	5.63	10.71	9.00	10.54	8.88	7.38	4.92	4.01	7.64	5.33	7.12	5.41
March	9.90	8.65	7.25	5.84	9.87	8.65	9.84	8.30	7.29	5.16	4.35	7.78	5.42	7.34	5.58
April	9.00	7.95	6.85	5.76	8.97	7.93	8.97	8.01	7.08	5.23	4.59	7.54	5.32	7.14	5.52
May	8.15	7.20	6.21	5.20	7.93	7.06	7.76	7.55	6.76	4.72	4.18	7.23	5.13	6.71	5.34
June	8.08	7.30	6.33	5.09	7.67	6.89	7.48	7.86	7.24	4.40	3.62	6.67	4.74	6.21	4.87
July	8.13	7.22	6.02	4.78	7.59	6.90	7.29	7.94	7.24	4.06	3.19	6.13	4.10	5.81	4.42
August	9.39	8.38	6.48	4.80	8.99	8.04	8.78	8.96	7.90	4.13	3.22	6.22	3.99	6.20	4.22
September	9.12	7.96	5.78	4.00	9.00	7.76	8.87	8.63	7.26	3.96	3.07	5.61	3.82	5.58	3.89
October	9.58	8.01	5.81	4.06	9.71	8.10	9.71	8.60	7.04	4.02	3.25	5.50	3.70	5.42	3.78
November	10.92	8.72	5.61	3.86	11.06	8.76	11.06	9.02	7.18	3.99	3.20	5.79	3.84	5.56	3.88
December	9.84	7.91	5.04	3.53	10.14	7.89	10.21	7.81	6.11	3.69	3.00	5.21	3.43	5.07	3.60
Average	9.62	8.22	6.34	4.88	9.48	8.11	9.36	8.50	7.25	4.48	3.68	6.60	4.52	6.32	4.67

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-reporting service of the bureau. Earlier data in 1927 Yearbook, pp. 991–994, and in 1931 Yearbook, pp. 834–835.

TABLE 324.—*Cattle and calves: Slaughter*[1] *under Federal inspection by months, 1922–1931*

CATTLE

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
1922	642	569	674	590	702	724	697	761	796	884	859	779	8,678
1923	745	634	688	697	762	727	725	821	810	953	846	756	9,163
1924	812	669	665	689	773	670	764	786	870	1,016	952	926	9,593
1925	855	656	736	731	749	732	862	811	866	1,067	861	927	9,853
1926	819	695	786	766	788	852	864	811	971	996	947	887	10,180
1927	786	700	761	742	785	799	743	838	828	895	881	761	9,520
1928	711	666	665	623	723	706	662	717	764	801	762	667	8,467
1929	736	569	632	662	676	636	706	726	753	839	731	658	8,324
1930	713	561	615	635	689	654	710	700	760	836	605	692	8,170
1931	651	559	635	690	704	667	706	727	687	781	614	686	8,108

CALVES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1922	288	279	391	365	401	389	329	345	353	383	348	309	4,182
1923	351	297	368	400	467	388	379	403	338	416	370	324	4,500
1924	373	346	377	466	470	408	421	374	419	473	392	416	4,935
1925	394	378	466	496	481	473	473	439	422	486	398	445	5,353
1926	410	378	464	461	455	480	425	379	408	446	435	410	5,153
1927	397	377	457	454	462	430	355	389	357	413	410	376	4,877
1928	383	374	407	438	473	398	362	369	352	405	378	341	4,680
1929	369	311	409	460	427	344	363	338	365	398	358	346	4,489
1930	374	329	388	455	421	356	375	363	374	438	324	398	4,595
1931	379	353	416	471	425	417	356	357	393	407	355	388	4,717

Bureau of Animal Industry.

[1] The figures include condemned carcasses.

TABLE 325.—*Beef and beef products: International trade, average 1925–1929, annual 1928–1930*

Country	Calendar year							
	Average 1925–1929		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Argentina	1, 552, 601	93	1, 309, 898	238	1, 234, 142	63	1, 114, 480	66
Uruguay	287, 281	0	226, 384	0	215, 404	0	[1] 329, 829	[2] 0
Australia	284, 476	1, 711	245, 146	2, 385	277, 586	1, 211	224, 986	863
Netherlands [3]	237, 540	159, 721	235, 390	128, 389	205, 521	117, 779	179, 228	137, 113
United States	144, 303	45, 769	119, 779	81, 029	126, 442	69, 268	117, 985	15, 339
New Zealand	115, 286	626	143, 181	602	9[illegible], 082	796	103, 098	592
Brazil	109, 765	7, 221	148, 933	9, 198	167, 272	5, 535	232, 362	5, 794
Canada	42, 516	1, 867	52, 111	2, 649	33, 192	5, 324	10, 016	3, 784
Denmark	27, 793	12, 359	10, 857	10, 725	14, 613	11, 142	51, 966	9, 493
Union of South Africa	23, 193	8, 935	17, 793	9, 138	25, 950	9, 158	30, 585	6, 311
Poland	17, 646	2, 032	13, 222	2, 395	12, 918	1, 521	23, 457	1, 904
Rumania	11, 678	[4] 387	11, 446	----------	[2] 13, 705	[2] 8	[2] 18, 989	[2] 2
Irish Free State	8, 992	8, 581	14, 478	5, 529	9, 515	4, 518	4, 946	656
China	5, 071	1, 619	4, 968	2, 205	3, 050	1, 865	3, 061	1, 815
Hungary	4, 834	207	2, 561	53	3, 838	50	9, 626	39
Total	2, 872, 975	251, 128	2, 556, 147	25[illegible], 535	2, 434, 230	228, 233	2, 464, 614	183, 771
PRINCIPAL IMPORTING COUNTRIES								
United Kingdom	34, 345	1, 795, 364	29, 178	1, 749, 139	23, 446	1, 638, 697	29, 176	1, 640, 993
Germany	4, 267	386, 911	5, 887	332, 852	8, 656	253, 740	21, 478	193, 629
France	35, 552	147, 055	45, 712	68, 515	39, 973	57, 150	38, 078	112, 043
Belgium	37, 959	122, 165	31, 866	83, 253	18, 977	76, 711	19, 638	88, 662
Japan	0	68, 201	0	68, 918	0	68, 059	0	69, 888
Cuba	267	44, 490	1, 076	45, 773	258	43, 418	0	31, 031
Italy	335	23, 611	236	24, 050	310	16, 833	251	21, 620
Sweden	8, 759	19, 664	6, 861	15, 416	7, 516	15, 028	9, 333	16, 430
Spain	55	16, 785	220	16, 170	20	17, 731	41	12, 715
Norway	1, 880	14, 365	2, 434	12, 741	2, 634	11, 295	1, 579	9, 949
British India	1, 254	11, 346	1, 399	9, 279	1, 247	10, 969	978	11, 2[illegible]3
Philippine Islands	0	11, 013	0	10, 321	0	10, 849	0	6, 446
Czechoslovakia	464	8, 165	529	2, 738	410	4, 918	247	6, 349
British Malaya	682	6, 958	679	7, 607	842	7, 500	728	6, 940
Switzerland	799	6, 373	611	6, 530	963	7, 401	626	6, 892
Finland	899	5, 235	62	5, 814	103	5, 643	----------	4, 150
Egypt	11	4, 767	16	5, 416	10	5, 986	0	2, 969
Chile	125	3, 645	129	780	176	2, 711	[2] 38, 784	----------
Total	126, 843	2, 696, 113	125, 886	2, 465, 322	105, 541	2, 254, 639	160, 937	2, 241, 949

Bureau of Agricultural Economics. Official sources, except as otherwise noted.

[1] Preliminary.
[2] International Yearbook of Agricultural Statistics.
[3] Year ended June 30.
[4] 4-year average.

TABLE 326.—*Beef, frozen, cured, and in process of cure: Stocks in cold-storage warehouses and meat-packing establishments, United States, 1922–1931*

Kind and year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Beef frozen:												
1922	68, 495	61, 522	55, 785	50, 772	45, 341	37, 548	31, 593	27, 727	28, 210	34, 611	47, 929	73, 027
1923	91, 805	89, 272	75, 604	65, 292	54, 522	41, 207	34, 385	24, 112	24, 625	27, 590	43, 772	71, 024
1924	82, 984	79, 944	76, 769	68, 075	52, 941	41, 784	37, 028	29, 435	29, 135	28, 599	45, 857	76, 731
1925	114, 034	111, 947	101, 599	87, 684	67, 271	46, 887	36, 452	26, 970	22, 879	19, 755	27, 008	50, 436
1926	59, 850	55, 705	51, 498	43, 528	32, 372	26, 649	23, 997	23, 509	21, 311	25, 267	38, 079	59, 603
1927	72, 352	67, 431	60, 659	50, 945	39, 712	28, 719	23, 261	18, 552	17, 241	19, 456	26, 696	45, 567
1928	54, 968	50, 673	44, 017	37, 625	28, 253	20, 654	17, 256	18, 896	17, 603	22, 463	41, 635	60, 189
1929	77, 051	72, 117	67, 486	60, 664	51, 442	39, 878	35, 759	31, 085	32, 122	38, 996	51, 902	70, 390
1930	77, 230	72, 692	69, 800	64, 146	57, 273	49, 913	46, 819	45, 830	42, 433	43, 515	47, 221	54, 894
1931	55, 649	52, 130	47, 334	41, 509	34, 082	31, 195	28, 842	25, 211	24, 061	20, 861	20, 871	25, 364
Beef, cured and in process of cure:												
1922	16, 313	16, 774	17, 997	18, 744	19, 166	19, 304	19, 113	19, 304	20, 081	18, 961	19, 884	22, 602
1923	24, 450	24, 841	24, 987	25, 210	24, 013	23, 816	22, 835	21, 781	21, 416	20, 597	19, 649	22, 142
1924	22, 593	22, 711	23, 238	25, 199	25, 482	24, 285	22, 390	20, 377	19, 771	18, 939	21, 387	23, 508
1925	28, 930	28, 758	29, 210	28, 634	28, 952	27, 731	25, 102	22, 704	22, 335	20, 964	20, 473	23, 128
1926	25, 146	24, 833	26, 192	27, 253	27, 606	25, 930	24, 691	22, 539	20, 386	20, 983	23, 119	26, 374
1927	28, 521	27, 823	27, 361	26, 214	23, 216	21, 694	20, 495	17, 170	16, 205	16, 422	17, 220	19, 778
1928	21, 979	20, 978	19, 732	19, 631	17, 941	16, 558	14, 982	13, 546	13, 462	14, 760	16, 401	19, 444
1929	21, 862	21, 873	21, 285	20, 943	19, 272	17, 437	16, 296	14, 845	15, 892	17, 438	20, 157	23, 054
1930	26, 653	26, 328	25, 798	24, 597	23, 347	21, 643	20, 072	18, 761	17, 322	16, 508	16, 641	18, 498
1931	19, 636	20, 268	20, 288	19, 602	19, 068	18, 253	16, 706	15, 844	14, 989	14, 310	13, 536	13, 794

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

TABLE 327.—*Cattle-tick eradication: Progress and status of the work December 1, 1931*

State	Quarantined counties		Released counties Dec. 1, 1931			Released counties tick free on—			Cattle inspected and dipped, year ended Dec. 1, 1931[1]	
	July 1, 1906	Dec. 1, 1931	Tick free	With 1 or more infested herds	Total counties released	Nov. 1, 1929	Nov. 1, 1930	Nov. 1, 1931	Herds	Cattle
Alabama	67	0	67	0	67	63	64	67	56, 246	456, 433
Arkansas	75	8	55	12	67	45	53	55	345, 647	1, 726, 724
California	15	0	15	0	15	15	15	15	0	0
Florida	67	25	41	1	42	30	33	41	104, 494	1, 646, 547
Georgia	158	0	158	0	158	155	158	158	13, 168	127, 358
Kentucky	2	0	2	0	2	2	2	2	0	0
Louisiana	64	42	17	5	22	3	10	17	59, 300	773, 051
Mississippi	82	0	77	5	82	55	78	77	10, 206	91, 846
Missouri	4	0	4	0	4	4	4	4	0	0
North Carolina	73	0	73	0	73	73	70	73	7, 046	30, 927
Oklahoma	61	0	61	0	61	60	61	61	2, 215	23, 420
South Carolina	46	0	46	0	46	46	46	46	3, 051	28, 263
Tennessee	42	0	42	0	42	42	42	42	0	0
Texas	198	52	113	33	146	94	116	113	602, 261	10, 790, 719
Virginia	31	0	30	1	31	30	31	30	287	2, 908
Total	985	127	801	57	858	717	783	801	1, 203, 921	15, 698, 196

Bureau of Animal Industry.

[1] More than 13,000 dipping vats were in use for official dipping during the year.

TABLE 328.—*Cattle and calves: Shipments, slaughter, value of production, and income, by States, 1930*

State and division	Shipments and local slaughter				Inshipments, stocker, feeding, breeding, and dairy		Farm slaughter				Value of amount consumed on farms	Receipts from sales	Gross income	Value of production
	Cattle		Calves				Cattle		Calves					
	Head	Total weight	Head	Total weight	Head	Total weight	Head	Total weight	Head	Total weight				
	Thousands	*1000 pounds*	*Thousands*	*1,000 pounds*	*Thousands*	*1,000 pounds*	*Thousands*	*1,000 pounds*	*Thousands*	*1,000 pounds*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
Maine	28	22, 600	43	4, 925	2	1, 600	10	7, 000	15	1, 875	134	2, 657	2, 791	2, 805
New Hampshire	21	17, 040	34	3, 820	6	4, 920	3	2, 400	5	650	50	1, 548	1, 598	1, 571
Vermont	46	37, 460	138	15, 925	8	6, 560	13	9, 100	14	1, 750	220	4, 214	4, 434	4, 737
Massachusetts	41	33, 020	71	8, 220	23	19, 550	3	2, 400	5	600	103	1, 456	1, 559	2, 027
Rhode Island	8	6. 500	10	1, 225	6	4, 980	1	700			16	168	184	307
Connecticut	25	20, 290	51	6, 325	9	7, 470	1	800	2	250	30	1, 406	1, 436	1, 895
New York	232	198, 400	702	102, 080	36	29, 700	34	28, 900	56	8, 736	1, 175	24, 267	25, 442	27, 553
New Jersey	34	30, 600	74	11, 470	23	19, 550	1	900	5	775	57	1, 476	1, 533	2, 404
Pennsylvania	235	205, 625	451	67, 650	61	45, 750	34	28, 900	50	7, 500	1, 348	23, 864	25, 212	24, 294
North Atlantic	670	571, 535	1, 574	221, 640	174	140, 080	100	81, 100	152	22, 136	3, 133	61, 056	64, 189	67, 593
Ohio	286	243, 100	457	73, 120	58	38, 860	31	26, 350	28	4, 480	1, 548	26, 853	28, 401	27, 053
Indiana	313	281, 700	340	51, 000	143	102, 245	17	13, 175	20	5, 000	959	22, 619	23, 578	25, 762
Illinois	767	713, 310	458	65, 220	437	314, 640	17	14, 025	37	7, 400	1, 072	46, 019	47, 091	47, 243
Michigan	217	179, 025	380	58, 900	27	16, 200	35	28, 000	76	12, 008	1, 336	21, 340	22, 676	22, 728
Wisconsin	376	374, 500	1, 085	124, 775	44	32, 120	12	10, 800	103	12, 875	590	37, 050	37, 640	41, 418
North Central, East	1, 959	1, 791, 635	2, 720	373, 015	709	504, 065	112	92, 350	264	41, 763	5, 505	153, 881	159, 386	164, 204
Minnesota	655	573, 350	655	90, 556	195	130, 650	38	31, 540	78	17, 160	2, 719	42, 853	45, 572	49, 623
Iowa	1, 580	1, 495, 500	280	44, 000	687	460, 290	29	24, 360	30	6, 000	2, 206	100, 988	103, 194	105, 167
Missouri	840	755, 000	407	61, 050	481	303, 030	20	15, 500	16	4, 000	841	44, 926	45, 767	48, 249
North Dakota	252	210, 420	76	10, 640	20	14, 000	18	14, 040	27	8, 100	1, 248	14, 366	15, 614	19, 461
South Dakota	539	463, 540	67	15, 410	130	87, 100	18	15, 480	12	3, 600	1, 312	32, 981	34, 293	37, 671
Nebraska	1, 281	1, 219, 215	166	47, 505	714	478, 380	25	21, 000	25	7, 500	2, 240	80, 245	82, 485	87, 130
Kansas	1, 430	1, 315, 600	195	50. 700	836	509, 960	33	26, 400	15	5, 250	1, 872	69, 016	70, 888	76, 923
North Central, West	6, 577	6, 032, 625	1, 846	319, 861	3, 063	1, 983, 410	181	148, 320	203	51, 610	12, 438	385, 375	397, 813	424, 224
North Central	8, 536	7, 824, 260	4, 566	692, 876	3, 772	2, 487, 475	293	240, 670	467	93, 373	17, 943	539, 256	557, 199	588, 428
Delaware	3	2, 400	26	3, 510			1	800	1	135	25	683	708	674
Maryland	30	25, 500	119	16, 065	7	4, 900	4	3, 400	4	540	119	3, 670	3, 789	3, 894
Virginia	140	123, 750	150	20, 620	5	2, 750	11	8, 250	11	1, 430	298	11, 421	11, 719	10, 582
West Virginia	95	82, 500	109	19, 075	1	635	10	8, 250	15	2, 625	293	8, 428	8, 721	6, 969

North Carolina	35	24, 500	59	7, 375	------	------	18	10, 800	25	3, 125	370	3, 280	3, 650	4, 798
South Carolina	36	25, 200	36	4, 500	1	700	8	4, 800	9	1, 125	87	2, 028	2, 115	2, 043
Georgia	104	49, 920	90	15, 750	19	9, 120	36	17, 280	30	5, 700	346	4, 832	5, 178	5, 447
Florida	47	22, 325	48	5, 520	2	1, 400	12	5, 700	7	805	83	2, 047	2, 130	1, 573
South Atlantic	490	356, 095	637	92, 415	35	19, 505	100	59, 280	102	15, 485	1, 621	36, 389	38, 010	35, 980
Kentucky	225	185, 750	219	35, 300	30	21, 000	8	6, 000	18	3, 960	323	15, 904	16, 227	12, 969
Tennessee	186	147, 740	126	17, 010	19	13, 300	10	7, 000	18	4, 500	292	10, 850	11, 142	11, 209
Alabama	85	44, 625	83	12, 450	10	4, 000	25	11, 250	25	4, 375	305	3, 688	3, 993	4, 139
Mississippi	143	85, 800	66	9, 900	7	3, 500	12	6, 480	30	4, 800	184	4, 832	5, 016	6, 536
Arkansas	116	71, 425	39	6, 825	1	500	32	15, 200	30	6, 300	287	4, 268	4, 555	4, 451
Louisiana	82	49, 200	47	6, 580	20	7, 000	24	11, 280	17	3, 060	457	4, 002	4, 459	5, 137
Oklahoma	668	511, 020	191	47, 750	321	216, 675	15	10, 500	21	5, 250	530	20, 921	21, 451	27, 300
Texas	1, 132	894, 280	774	216, 720	212	154, 760	30	19, 500	80	22, 400	1, 367	62, 929	64, 296	65, 737
South Central	2, 637	1, 989, 840	1, 545	352, 535	620	420, 735	156	87, 210	239	54, 645	3, 745	127, 394	131, 139	137, 478
Montana	318	286, 200	40	8, 000	52	39, 000	13	11, 180	14	3, 500	659	18, 871	19, 530	21, 366
Idaho	129	116, 100	36	6, 480	27	18, 900	6	4, 500	17	2, 720	162	7, 491	7, 653	9, 229
Wyoming	205	169, 125	17	5, 525	41	26, 650	5	4, 125	6	1, 980	358	10, 836	11, 194	13, 132
Colorado	473	401, 300	64	17, 600	210	163, 800	12	9, 000	15	4, 500	634	22, 567	23, 201	25, 403
New Mexico	380	266, 000	77	23, 100	135	86, 400	12	8, 100	14	4, 200	663	13, 834	14, 497	14, 780
Arizona	208	143, 136	100	27, 000	89	61, 588	8	5, 216	12	3, 000	396	6, 488	6, 884	10, 873
Utah	93	86, 650	35	7, 000	15	11, 250	4	3, 400	8	1, 600	204	6, 388	6, 592	6, 543
Nevada	67	62, 000	14	3, 080	7	5, 600	4	3, 000	2	440	183	4, 667	4, 850	4, 355
Washington	82	73, 800	79	14, 220	6	4, 500	13	9, 750	45	7, 425	453	7, 914	8, 367	9, 465
Oregon	132	128, 040	46	9, 200	12	9, 000	17	13, 260	32	4, 800	368	11, 330	11, 698	12, 808
California	570	538, 500	350	81, 900	353	268, 986	20	17, 600	28	6, 020	1, 102	30, 918	32, 020	32, 590
Western	2, 657	2, 270, 851	858	203, 105	947	695, 674	114	89, 131	193	40, 185	5, 182	141, 304	146, 486	160, 544
United States	14, 990	13, 012, 581	9, 180	1, 562, 571	5, 548	3, 763, 469	763	557, 391	1, 153	225, 824	31, 624	905, 399	937, 023	990, 023

Bureau of Agricultural Economics. Estimates Division Crop and Livestock Estimates subject to revision. For 5-year average 1924–1928, see 1931 Yearbook Tables 370 and 371. The figures on income and value of production as shown in Table 455 are computed from the data shown in this table. The difference between gross income and value of production arises from the fact that in computing value of production allowance is made for changes in inventory numbers between the beginning and end of the year while in computing income these changes are not used.

TABLE 329.—*Hogs: Number on farms and value per head in the United States, 1840, 1850, 1860, 1867–1932*

Year	Hogs on farms: Number [1]	Hogs on farms: Value per head Jan. 1 [2]	Year	Hogs on farms: Number [1]	Hogs on farms: Value per head Jan. 1 [3]
	Thousands	*Dollars*		*Thousands*	*Dollars*
1840 [4]	*26, 301*	--------	1900 [5]	37, 079	--------
1850 [4]	*30, 354*	--------	1900 [4]	*62, 868*	--------
1860 [4]	*33, 513*	--------	1900	52, 600	5. 28
1867	24, 694	4. 03	1901	53, 200	6. 55
1868	24, 317	3. 29	1902	46, 800	7. 43
1869	23, 316	4. 65	1903	47, 200	8. 22
1870 [4]	*25, 135*	--------	1904	49, 500	6. 50
1870	26, 751	5. 80	1905	52, 000	6. 33
1871	29, 458	5. 61	1906	54, 600	6. 53
1872	31, 796	4. 01	1907	57, 300	8. 05
1873	32, 632	3. 67	1908	61, 300	6. 39
1874	30, 861	3. 98	1909	57, 000	6. 92
1875	28, 062	4. 80	1910 [4]	*58, 186*	--------
1876	25, 727	6. 00	1910	49, 300	9. 69
1877	28, 077	5. 66	1911	55, 700	9. 90
1878	32, 262	4. 85	1912	55, 700	8. 46
1879	34, 766	3. 18	1913	54, 000	10. 42
1880 [4]	*47, 682*	--------	1914	51, 800	10. 99
1880	34, 034	4. 28	1915	57, 000	10. 43
1881	36, 248	4. 70	1916	59, 700	8. 88
1882	44, 122	5. 97	1917	56, 700	12. 42
1883	43, 270	6. 75	1918	61, 200	20. 65
1884	44, 201	5. 57	1919	63, 800	23. 28
1885	45, 143	5. 02	1920 [4]	*59, 346*	--------
1886	46, 092	4. 26	1920	60, 159	20. 00
1887	44, 613	4. 48	1921	58, 942	13. 63
1888	44, 347	4. 98	1922	59, 849	10. 58
1889	50, 302	5. 79	1923	69, 304	12. 29
1890 [4]	*57, 410*	--------	1924	66, 576	10. 30
1890	51, 603	4. 72	1925 [4]	*50, 854*	--------
1891	50, 625	4. 15	1925	55, 770	13. 15
1892	52, 398	4. 60	1926	52, 085	15. 66
1893	46, 095	6. 41	1927	55, 468	17. 19
1894	45, 206	5. 98	1928	61, 772	13. 17
1895	44, 166	4. 97	1929	58, 789	12. 94
1896	42, 843	4. 35	1930 [4]	*56, 293*	--------
1897	40, 600	4. 10	1930	55, 301	13. 46
1898	39, 760	4. 39	1931	54, 374	11. 36
1899	38, 652	4. 40	1932 [6]	59, 511	6. 14

Bureau of Agricultural Economics. Estimates of the crop reporting board. Revisions for the years 1920–1931 were made January, 1932.

[1] Prior to 1900 estimates for each 10-year period represent an index of annual changes applied to census as base on first report after census data were available: 1900–1919 are tentative revised estimates of the Bureau of Agricultural Economics as first published in 1927 Yearbook.
[2] Series for 1867–1899 are values of all hogs as reported.
[3] Data for 1900–1925 are an old series for all hogs as reported, adjusted on basis average relationship between the new and the old series from 1926 to 1928. Old series was shown in 1928 Yearbook. Conversion factor was 1.057 (base was old series). Data for 1926–1932 are a new series, referred to above, of average values by age and sex classification weighted by numbers in each class.
[4] Italic figures are from the census. Figures for census years 1880 and 1890 exclude estimate of unenumerated swine on ranges as follows: 1880, 2,093,970; 1890, 17,276. Census dates were June 1 from 1840 to 1900; Apr. 15, 1910; Jan. 1, 1920 and 1925; Apr. 1, 1930. 1900, 1910, and 1930 include spring-born pigs.
[5] Original estimate of the Bureau of Agricultural Economics.
[6] Preliminary.

TABLE 330.—*Hogs, including pigs: Estimated number on farms and value per head, by States, January 1, 1928–1932*

State and division	Number					Value per head [1]				
	1928 [2]	1929 [2]	1930 [2]	1931 [2]	1932 [3]	1928	1929	1930	1931	1932
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Maine	70	53	49	50	55	15. 00	14. 80	14. 80	12. 90	8. 70
New Hampshire	29	24	18	15	15	16. 10	13. 60	15. 20	13. 10	8. 90
Vermont	56	38	30	29	32	14. 90	13. 60	14. 60	12. 00	7. 50
Massachusetts	97	90	97	101	101	15. 30	16. 00	16. 10	14. 00	8. 60
Rhode Island	5	5	5	5	5	18. 60	18. 00	17. 60	15. 40	8. 00
Connecticut	24	28	24	26	25	20. 20	18. 80	17. 00	15. 50	9. 20
New York	341	290	232	195	205	15. 10	14. 20	15. 40	12. 40	8. 70
New Jersey	80	72	72	72	78	14. 90	15. 70	16. 20	13. 00	10. 70
Pennsylvania	792	734	683	642	655	14. 70	13. 90	14. 40	12. 40	8. 50
North Atlantic	1, 494	1, 334	1, 210	1, 135	1, 171	14. 99	14. 34	14. 95	12. 71	8. 71
Ohio	2, 537	2, 309	2, 078	1, 974	2, 072	12. 50	11. 50	12. 40	10. 00	6. 60
Indiana	3, 227	3, 066	2, 637	2, 637	2, 900	13. 00	12. 30	12. 60	10. 70	6. 90
Illinois	5, 274	4, 852	4, 415	4, 415	4, 940	13. 70	13. 80	14. 80	12. 60	6. 90
Michigan	862	759	630	542	661	12. 40	12. 20	12. 30	10. 50	6. 90
Wisconsin	1, 720	1, 534	1, 422	1, 536	1, 658	12. 90	14. 20	14. 30	12. 50	5. 90
North Central, East	13, 620	12, 520	11, 182	11, 104	12, 231	13. 13	12. 96	13. 63	11. 57	6. 74
Minnesota	3, 680	3, 366	3, 494	3, 665	3, 738	15. 10	15. 70	16. 30	13. 10	6. 30
Iowa	11, 124	10, 244	10, 200	10, 509	11, 350	14. 40	15. 10	16. 00	13. 40	6. 30
Missouri	4, 270	4, 313	3, 750	3, 488	4, 011	11. 70	12. 20	11. 40	8. 90	5. 70
North Dakota	689	772	730	766	650	13. 80	14. 50	14. 50	12. 40	5. 40
South Dakota	3, 000	2, 700	2, 800	3, 000	2, 490	15. 30	15. 20	16. 00	13. 40	5. 40
Nebraska	5, 340	5, 305	5, 010	4, 820	5, 110	15. 50	15. 00	15. 60	13. 40	5. 90
Kansas	2, 531	3, 006	2, 826	2, 487	3, 109	13. 70	12. 80	12. 80	10 50	5 50
North Central, West	30, 634	29, 706	28, 810	28, 735	30, 458	14 32	14. 49	15. 01	12. 53	5. 98
North Central	44, 254	42, 226	39, 992	39, 839	42, 689	13. 95	14. 04	14. 62	12. 26	6. 20
Delaware	28	26	25	23	22	12 00	10. 80	11. 70	10. 80	8. 50
Maryland	221	206	198	168	160	12. 30	10. 80	10. 60	9. 50	7. 50
Virginia	659	626	597	508	551	11. 20	9. 90	10. 00	8. 00	6. 10
West Virginia	228	208	200	168	176	12. 80	11. 60	10. 90	8. 50	7. 50
North Carolina	1, 050	945	830	838	880	12. 90	11. 70	11. 60	10. 20	7. 80
South Carolina	558	503	480	504	580	11. 20	9. 00	9. 60	8. 80	5. 60
Georgia	1, 500	1, 393	1, 312	1, 299	1, 390	9. 40	8. 20	9. 70	8. 40	5. 00
Florida	543	531	519	498	508	7. 60	8. 10	7. 50	6. 10	3. 70
South Atlantic	4, 787	4, 438	4, 161	4, 006	4, 267	10. 73	9. 56	9. 93	8. 56	5. 86
Kentucky	1, 040	988	920	732	899	9. 90	8. 50	9. 60	7. 60	5. 80
Tennessee	1, 163	1, 035	982	933	1, 075	10. 20	8. 60	9. 70	8. 20	6. 30
Alabama	982	912	845	870	957	10. 40	9. 50	10. 50	7. 90	5. 40
Mississippi	911	844	780	764	878	8. 90	8. 70	9. 30	7. 00	5. 30
Arkansas	1, 041	885	764	574	832	8. 60	8. 50	8. 60	6. 70	5. 80
Louisiana	527	586	637	605	679	9. 20	9. 70	8. 80	7. 30	6. 50
Oklahoma	1, 104	1, 215	1, 053	927	1, 205	11. 10	9. 60	9. 40	8. 10	5. 00
Texas	1, 800	1, 760	1, 673	1, 606	2, 088	11. 50	9. 70	9. 70	8. 20	6. 00
South Central	8, 568	8, 225	7, 654	7, 061	8, 613	10. 18	9. 15	9. 51	7. 75	5. 75
Montana	270	300	280	280	283	14. 30	13. 10	12. 10	11. 30	5. 30
Idaho	336	285	245	270	351	12. 90	11. 70	11. 50	10. 90	5. 00
Wyoming	170	150	130	137	123	13. 50	12. 50	12. 00	10. 80	5. 40
Colorado	509	550	495	520	624	13. 10	12. 10	12. 00	11. 10	5. 20
New Mexico	67	65	65	62	74	10. 40	10. 70	10. 80	9. 60	5. 70
Arizona	23	25	21	21	23	13. 10	13. 30	13. 30	10. 30	5. 90
Utah	90	74	70	77	96	11. 50	10. 20	10. 50	9. 70	5. 20
Nevada	26	23	20	18	21	12. 30	12. 50	11. 50	9. 90	6. 70
Washington	238	214	173	183	238	14. 10	12. 70	13. 00	11. 90	6. 80
Oregon	270	230	195	205	266	12. 20	10. 50	11. 70	11. 10	6. 20
California	670	650	590	560	672	13. 60	12. 60	12. 00	11. 10	6. 30
Western	2, 669	2, 566	2, 284	2, 333	2, 771	13. 22	12. 15	11. 95	11. 05	5. 75
United States	61, 772	58, 789	55, 301	54, 374	59, 511	13. 17	12. 94	13. 46	11. 36	6. 14

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revisions by States, 1920–1927, are published in February, 1932, Crops and Markets.

[1] Sum of total value of subgroups (classified by age and sex), divided by total number and rounded to nearest dime for States. Division and United States averages not rounded. State figures are new weighted value series not comparable to State figures previously published years prior to 1925.

[2] Revised, January, 1932.

[3] Preliminary.

TABLE 331.—*Hogs: Numbers in countries having 150,000 and over, average 1921–1925, annual 1926–1931*

Country	Month of estimate	Average 1921–1925 [1]	1926	1927	1928	1929	1930	1931
North and Central America and West Indies:		*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
United States	January	62,088	52,085	55,468	61,772	58,789	55,301	54,374
Canada	June	4,344	4,360	4,695	4,497	4,382	4,000	
Mexico	do	[2] 1,125	2,903					
Guatemala		57	92	70	89	72	79	
Salvador		(330)					[3] 335	
Cuba		(591)					591	
Dominican Republic	May	866						
Haiti			170	185	200	220		
Estimated total [4]		73,000						
South America:								
Colombia		1,352	1,400	1,366			1,434	
Venezuela		512						
Ecuador		150				153		
Peru	February–April	429				[3] 689		
Bolivia		362	498	268		336		
Chile		255					[3] 331	
Brazil	September	[3 5] 16,169						[6] 20,000
Uruguay		278					[3] 300	
Argentina	December [7]	[3 8] 1,437					[3 9] 3,769	
Estimated total [4]		21,000						
Europe:								
England and Wales	June	2,658	2,200	2,692	2,971	2,367	2,310	2,777
Isle of Man	do	4	3	4	4	3	4	
Scotland	do	167	145	197	196	142	143	154
Northern Ireland	do	134	159	236	229	192	216	236
Irish Free State	do	947	884	1,178	1,183	945	1,052	1,227
Norway [10]	do	216	303	300	283	289	339	317
Sweden	do	1,056		1,369			[3 11] 1,684	1,761
Denmark	July	2,314	3,122	3,731	3,363	3,618	4,872	5,473
Netherlands	May–June	1,519					2,018	[6] 2,434
Belgium	December [7]	1,081	1,152	1,144	1,124	1,139	1,237	1,250
France	do [7]	5,302	5,793	5,777	6,019	6,017	6,102	6,329
Spain	do [7]	4,500	5,267	5,032		[3] 4,773		
Portugal		1,019						
Italy	March–April	2,630	[6] 2,850				[3] 3,157	
Switzerland	April	[3] 640	637					[3] 924
Germany	December [7]	15,776	16,200	19,424	22,899	20,106	19,944	23,365
Austria	do [7]	1,399					[3] 1,965	
Czechoslovakia	do [7]	2,201	2,539				[3 12] 3,088	2,776
Hungary	April and July	2,424	2,520	2,387	2,662	2,582	2,362	2,715
Yugoslavia	January	2,875	2,806	2,770	2,663	2,675	(2,800)	2,924
Greece	December [7]	390	452	510	453	419	276	
Bulgaria	do [7]	832		1,002				
Rumania	do [7]	2,976	3,088	3,168	2,987	2,684	2,300	2,323
Poland	November	5,287		6,333		[9] 4,829	[9] 6,047	[9] 7,314
Lithuania	Spring	1,521	1,441	1,010	1,060	944	1,136	
Latvia	June	465	521	535	535	[6] 382	523	712
Estonia	July	299	333	354	327	279	290	
Finland	September	378	391	418	435	426		
Russia, European and Asiatic [13]	Summer	21,184	20,920	23,202	26,100	20,500	13,200	
Estimated total excluding Russia [4]		61,100						
Africa:								
Union of South Africa	April–August	888	932	870	857	820		
Madagascar	February	369	386	335	328	412	531	
Estimated total [4]		2,200						
Asia:								
China (including Turkestan and Manchuria)		[14] 62,500						
Japan	December [7]	590	673	621	677	764	706	
Chosen	do [7]	1,078	1,150	1,221	1,244	1,277	1,328	1,387
Taiwan	do	1,302	1,435	1,543	1,643	1,718	1,754	
French-Indo China		2,767	2,361	2,361	2,621	2,782	3,049	

See footnotes at end of table.

TABLE 331.—*Hogs: Numbers in countries having 150,000 and over, average 1921–1925, annual 1926–1931*—Continued

Country	Month of estimate	Average 1921–1925 [1]	1926	1927	1928	1929	1930	1931
		Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
Asia—Continued.								
Siam	March	864						
Straits Settlements		220						
Philippine Islands	December [7]	5,768	8,885	9,298	9,798			
Dutch East Indies—Outer possessions	do	783		833				
Estimated total excluding Russia [4]		76,400						
Oceania:								
Australia	December [7]	918	1,128	989	878	910	1,018	
New Zealand	January	396	473	520	587	557	488	
Estimated total [4]		1,400						
Total countries reporting all periods, including Russia:								
To 1930 (28) [15]		134,642	126,185	136,442	149,394	136,946	127,360	
To 1931 (15) [15, 16]		100,501	92,128	100,228	110,130	103,204	100,829	105,563
Estimated world total including Russia [4]		256,300						

Bureau of Agricultural Economics. Official estimates and International Institute of Agriculture unless otherwise stated.

[1] Average for 5-year period if available, otherwise for any year or years within that period unless otherwise stated.
[2] Incomplete.
[3] Census figure.
[4] These totals include interpolations for a few countries not reporting each year, and rough estimates for some others.
[5] Year 1920.
[6] Unofficial.
[7] Estimates reported as of December have been considered as of Jan. 1 of the following year; i. e., the figure for the number of swine in France as of Dec. 31, 1925, has been put in the 1926 column.
[8] Year 1922.
[9] June.
[10] Number in rural communities.
[11] September.
[12] May.
[13] Year 1916, from the Soviet Union Review, April, 1928, p. 52. Years 1924–1925, Statistical Review, October, 1928; 1926 Controlling Figures for National Economy of the U. S. S. R. 1929–1930; year, 1927, Agricultural Statistics of the U. S. S. R., Lenin Academy, 1928–30; Planned Economy No. 12, 1930 State Planning Board.
[14] Estimates for all China based on official estimate for 1920 in 20 provinces which supported over 50 per cent of the total in China in 1914.
[15] Comparable totals for the number of countries indicated.
[16] Excluding Russia.

TABLE 332.—*Hogs: Receipts at all public stockyards, 1922–1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
1922	4,278	3,613	3,411	3,067	3,737	3,776	2,980	3,037	3,062	3,682	4,421	5,004	44,068
1923	5,306	4,492	4,927	4,318	4,524	4,204	4,181	3,714	3,607	4,816	5,416	5,825	55,330
1924	6,253	5,335	4,833	4,374	4,321	4,296	4,091	3,197	3,216	3,990	4,904	6,604	55,414
1925	6,105	4,558	3,528	3,247	3,283	3,507	2,798	2,549	2,741	3,390	3,843	4,380	43,929
1926	4,304	3,372	3,579	3,135	3,037	3,143	2,854	2,804	2,819	3,261	3,554	3,910	39,772
1927	4,252	3,308	3,754	3,142	3,613	3,775	3,046	3,042	2,565	3,039	3,666	4,209	41,411
1928	5,306	5,267	4,639	3,483	3,723	3,548	2,924	2,523	2,600	3,666	4,075	4,773	46,527
1929	5,133	4,000	3,436	3,582	3,431	3,275	3,297	2,964	3,089	3,701	3,933	4,256	44,097
1930	4,720	3,781	3,294	3,255	3,293	3,215	2,918	2,617	2,799	3,441	3,439	4,002	40,774
1931	4,652	3,704	3,207	3,067	2,938	2,854	2,511	2,454	2,727	3,462	3,752	4,210	39,538

Bureau of Agricultural Economics. Compiled from data of the livestock and meat reporting service of the bureau. Earlier data in 1930 Yearbook, p. 850, Table 376.

TABLE 333.—*Hogs: Receipts at principal public stockyards and all public stockyards, 1922–1931*

Year	Chicago	Denver	East St. Louis	Fort Worth	Kansas City	Omaha	St. Joseph	South St. Paul	Sioux City	Total 9 markets [1]	All other stockyards reporting	Total all stockyards reporting [1]
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
1922	8, 156	395	3, 606	510	2, 655	2, 839	2, 061	2, 523	1, 856	24, 601	19, 467	44, 068
1923	10, 460	495	4, 831	486	3, 615	3, 649	2, 457	3, 338	2, 989	32, 321	23, 009	55, 330
1924	10, 443	569	4, 580	392	2, 933	3, 978	2, 234	3, 751	3, 732	32, 613	22, 801	55, 414
1925	7, 996	467	3, 512	312	2, 067	3, 355	1, 673	3, 637	3, 396	26, 415	17, 514	43, 929
1926	7, 093	497	3, 536	217	2, 036	2, 647	1, 462	3, 451	2, 475	23, 413	16, 359	39, 772
1927	7, 724	457	3, 710	338	1, 904	2, 631	1, 425	3, 105	2, 322	23, 616	17, 795	41, 411
1928	8, 539	567	4, 036	432	2, 391	3, 179	1, 724	2, 902	2, 754	26, 525	20, 002	46, 527
1929	8, 193	539	3, 865	402	2, 476	3, 166	1, 627	2, 869	2, 313	25, 450	18, 647	44, 097
1930	7, 870	512	3, 459	279	2, 015	3, 363	1, 446	2, 759	2, 317	24, 021	16, 753	40, 774
1931	7, 942	597	2, 970	216	1, 337	3, 525	1, 322	3, 251	2, 646	23, 805	15, 733	39, 538

Bureau of Agricultural Economics. Compiled from data of the livestock and meat reporting service of the bureau. Receipts, 1900–1920, are available in 1924 Yearbook, p. 902, Table 500.

[1] Rounded totals of complete figures.

TABLE 334.—*Hogs: Monthly average live weight, Chicago, 1922–23 to 1931–32*

Year beginning October	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Average Oct.–Mar. [1]	Apr.	May	June	July	Aug.	Sept.	Average Apr.–Sept. [1]
	Lbs.	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
1922–23	243	231	234	239	241	247	239	249	242	242	250	253	254	248
1923–24	247	234	231	227	229	237	234	239	239	241	251	255	254	246
1924–25	235	220	214	220	222	229	223	235	236	238	249	256	253	244
1925–26	242	228	225	231	235	245	234	244	247	255	271	281	267	261
1926–27	232	217	220	226	229	240	227	239	243	248	257	265	261	252
1927–28	235	215	217	225	230	235	226	233	234	239	251	257	251	244
1928–29	247	238	231	228	228	238	235	241	239	247	257	265	259	251
1929–30	242	223	224	228	231	235	230	234	238	245	257	255	244	246
1930–31	227	221	226	235	237	242	231	240	240	251	258	256	240	248
1931–32	222	217	223											

Bureau of Agricultural Economics. Livestock and meat reporting service. Weighted average of packer and shipper purchases. Data for 1900–1922 are available in 1924 Yearbook, p. 909, Table 506.

[1] Simple average.

TABLE 335.—*Hogs: Estimated average price per 100 pounds received by producers in the United States, 1922–23 to 1931–32*

Year beginning October	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Weighted average
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1922–23	8. 33	7. 78	7. 63	7. 77	7. 65	7. 52	7. 45	7. 13	6. 37	6. 68	6. 85	7. 81	7. 41
1923–24	7. 23	6. 66	6. 39	6. 59	6. 54	6. 63	6. 70	6. 68	6. 55	6. 60	8. 54	8. 50	6. 85
1924–25	9. 45	8. 62	8. 39	9. 31	9. 62	11. 83	11. 64	10. 78	10. 82	12. 02	12. 19	11. 50	10. 15
1925–26	11. 16	10. 66	10. 51	10. 99	11. 76	11. 65	11. 49	11. 97	12. 80	12. 69	11. 66	12. 07	11. 55
1926–27	12. 06	11. 45	10. 97	10. 97	11. 19	10. 89	10. 41	9. 41	8. 40	8. 58	9. 24	9. 78	10. 28
1927–28	10. 16	8. 99	8. 14	7. 81	7. 62	7. 48	7. 75	8. 82	8. 70	9. 64	10. 01	11. 17	8. 59
1928–29	9. 55	8. 51	7. 93	8. 18	8. 88	10. 00	10. 20	9. 96	9. 80	10. 33	10. 28	9. 53	9. 28
1929–30	9. 10	8. 54	8. 53	8. 80	9. 48	9. 57	9. 17	8. 99	9. 10	8. 38	8. 51	9. 44	8. 95
1930–31	8. 79	8. 20	7. 44	7. 25	6. 81	6. 92	6. 92	6. 35	5. 70	6. 20	6. 25	5. 44	6. 95
1931–32	4. 70	4. 36	3. 76										

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by number of hogs Jan. 1, to obtain a price for the United States; yearly price obtained by weighting monthly prices by Federal inspected slaughter. For previous data see 1931 or earlier Yearbooks.

TABLE 336.—*Hogs: Average price per 100 pounds at Chicago, by months, 1901–1931*

Year beginning October	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Simple average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1901	6.10	5.65	5.95	6.20	6.10	6.35	6.95	7.00	7.35	7.65	7.15	7.55	6.67
1902	7.00	6.30	6.20	6.40	6.75	7.30	7.20	6.45	6.00	5.55	5.45	5.85	6.37
1903	5.55	4.65	4.45	4.90	5.15	5.35	5.10	4.65	5.05	5.40	5.30	5.75	5.11
1904	5.40	4.80	4.50	4.65	4.85	5.15	5.45	5.40	5.35	5.65	5.95	5.50	5.22
1905	5.25	4.85	4.90	5.40	6.00	6.30	6.55	6.45	6.55	6.65	6.25	6.25	5.95
1906	6.40	6.20	6.25	6.60	7.05	6.65	6.65	6.40	6.10	6.05	6.00	6.00	6.36
1907	6.15	4.90	4.70	4.40	4.45	5.00	5.85	5.50	5.80	6.50	6.55	6.85	5.55
1908	5.95	5.80	5.65	6.10	6.35	6.70	7.20	7.30	7.65	7.85	7.75	8.20	6.88
1909	7.75	8.00	8.35	8.55	9.05	10.55	9.90	9.55	9.45	8.75	8.35	8.90	8.93
1910	8.50	7.60	7.65	7.95	7.40	6.85	6.25	6.00	6.25	6.70	7.30	6.90	7.11
1911	6.45	6.30	6.40	6.25	6.20	7.10	7.80	7.65	7.50	7.65	8.25	8.45	7.17
1912	8.75	7.75	7.40	7.45	8.15	8.90	9.05	8.55	8.65	9.05	8.35	8.30	8.36
1913	8.20	7.75	7.70	8.30	8.60	8.70	8.65	8.45	8.20	8.70	9.00	8.85	8.42
1914	7.65	7.50	7.10	6.90	6.80	6.75	7.30	7.60	7.60	7.25	6.90	7.25	7.22
1915	7.90	6.65	6.40	7.20	8.20	9.65	9.75	9.85	9.70	9.80	10.30	10.70	8.84
1916	9.80	9.60	9.95	10.90	12.45	14.80	15.75	15.90	15.50	15.20	16.90	18.20	13.75
1917	17.15	17.40	16.85	16.30	16.65	17.10	17.45	17.45	16.60	17.75	19.00	19.65	17.45
1918	17.70	17.70	17.55	17.60	17.65	19.10	20.40	20.60	20.40	21.85	20.00	17.45	19.00
1919	14.35	14.20	13.60	14.97	14.55	14.94	14.79	14.28	14.68	14.84	14.74	15.88	14.65
1920	14.17	11.83	9.55	9.41	9.42	10.00	8.50	8.35	8.19	9.69	9.26	7.61	9.66
1921	7.72	7.01	6.92	8.02	9.90	10.43	10.31	10.48	10.33	9.70	8.51	8.75	9.01
1922	8.80	8.07	8.18	8.29	8.02	8.18	8.08	7.53	6.92	7.04	7.65	8.35	7.93
1923	7.42	6.85	6.87	7.10	7.06	7.35	7.36	7.34	7.04	7.68	9.38	9.57	7.58
1924	9.91	8.97	9.38	10.38	11.06	13.55	12.55	12.06	12.57	13.46	12.66	12.52	11.59
1925	11.31	11.28	10.97	12.02	12.45	12.20	12.33	13.55	14.01	12.51	11.48	12.03	12.18
1926	12.72	11.80	11.57	11.96	11.73	11.28	10.69	9.59	8.78	9.05	9.03	10.22	10.70
1927	10.39	8.92	8.32	8.25	8.08	8.08	9.28	9.67	9.91	10.65	11.53	11.89	9.58
1928	9.57	8.83	8.61	9.22	10.19	11.44	11.41	10.81	10.72	11.20	10.52	9.85	10.20
1929	9.38	9.06	9.34	9.78	10.67	10.17	10.00	10.02	9.52	8.73	9.58	9.76	9.67
1930	9.34	8.55	7.92	7.65	7.06	7.46	7.26	6.53	6.36	6.33	5.98	5.41	7.15
1931	5.09	4.61	4.20	------	------	------	------	------	------	------	------	------	------

Bureau of Agricultural Economics. Monthly figures prior to 1920 are general average hog prices as published in the Chicago Drovers Journal Yearbook; subsequent figures compiled from reports of packer and shipper purchases; such purchases do not include pigs, boars, stags, extremely rough sows, or cripples. The yearly figures are the simple average of the October to September prices.

TABLE 337.—*Hogs: Slaughter[1] under Federal inspection by months, 1922–1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
1922	3,985	3,480	3,350	2,946	3,716	4,046	3,104	2,888	2,747	3,332	4,318	5,201	43,114
1923	5,134	4,231	4,838	4,179	4,325	4,303	3,983	3,556	3,212	4,328	5,341	5,904	53,334
1924	5,911	5,006	4,536	4,073	4,278	4,288	4,114	3,070	2,857	3,498	4,641	6,600	52,873
1925	5,979	4,447	3,299	3,037	3,186	3,732	2,819	2,453	2,598	3,314	3,646	4,533	43,043
1926	4,501	3,351	3,562	3,105	3,131	3,430	3,127	2,834	2,616	2,976	3,610	4,394	40,636
1927	4,514	3,395	3,837	3,330	3,766	4,253	3,431	3,050	2,534	2,969	3,688	4,869	43,633
1928	5,479	5,780	5,140	3,446	3,884	4,078	2,984	2,545	2,508	3,713	4,455	5,782	49,795
1929	5,738	4,478	3,645	3,761	3,798	3,756	3,597	3,130	3,104	3,857	4,499	5,083	48,445
1930	5,001	4,034	3,392	3,480	3,823	3,689	3,187	2,724	2,773	3,492	4,024	4,647	44,266
1931	5,362	4,142	3,523	3,488	3,408	3,251	2,767	2,500	2,955	3,772	4,218	5,387	44,772

Bureau of Animal Industry.

[1] The figures include condemned carcasses.

TABLE 338.—*Hogs: Average price per 100 pounds at Chicago and Omaha, by months, July, 1930–December, 1931*

CHICAGO

Year and month	Butcher, bacon, and shipper hogs						Packing sows (275-500 lbs.), Medium and Good	Average cost, packer and shipper hogs
	Light weight		Medium weight		Heavy weight			
	160-180 pounds Good and Choice	180-200 pounds Good and Choice	200-220 pounds Good and Choice	220-250 pounds Good and Choice	250-290 pounds Good and Choice	290-350 pounds Good and Choice		
1930	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
July	9.55	9.53	9.46	9.29	9.07	8.82	7.72	8.73
August	10.58	10.62	10.56	10.42	10.14	9.78	8.35	9.58
September	10.45	10.68	10.80	10.84	10.76	10.47	8.63	9.76
October	9.53	9.63	9.72	9.81	9.83	9.72	8.28	9.34
November	8.56	8.57	8.60	8.66	8.67	8.60	7.71	8.55
December	8.16	8.13	8.06	7.97	7.89	7.78	7.02	7.92
Average, 6 months	9.47	9.53	9.53	9.50	9.39	9.20	7.95	8.91
1931								
January	8.11	8.08	7.94	7.70	7.44	7.22	6.50	7.65
February	7.66	7.64	7.46	7.14	6.81	6.58	5.95	7.06
March	7.94	7.94	7.86	7.63	7.36	7.10	6.43	7.46
April	7.73	7.73	7.65	7.44	7.16	6.89	6.22	7.26
May	6.90	6.89	6.85	6.70	6.49	6.23	5.50	6.53
June	6.86	6.89	6.89	6.82	6.62	6.27	5.34	6.36
July	7.53	7.63	7.61	7.35	6.81	6.08	4.99	6.33
August	7.24	7.32	7.27	7.04	6.64	5.97	4.87	5.98
September	5.80	5.96	6.05	6.02	5.88	5.49	4.65	5.41
October	5.01	5.12	5.26	5.35	5.37	5.30	4.79	5.09
November	4.63	4.67	4.69	4.70	4.69	4.64	4.22	4.61
December	4.29	4.32	4.31	4.26	4.22	4.16	3.69	4.20
Average	6.64	6.68	6.65	6.51	6.29	5.99	5.26	6.16

OMAHA

Year and month	160-180 pounds Good and Choice	180-200 pounds Good and Choice	200-220 pounds Good and Choice	220-250 pounds Good and Choice	250-290 pounds Good and Choice	290-350 pounds Good and Choice	Packing sows (275-500 lbs.), Medium and Good	Average cost, packer and shipper hogs
1930	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
July	8.92	8.93	8.94	8.83	8.61	8.39	7.44	8.27
August	9.96	10.04	10.04	9.90	9.60	9.14	8.15	8.87
September	9.80	10.09	10.28	10.26	10.10	9.65	8.24	9.08
October	8.92	9.19	9.31	9.30	9.23	8.99	7.88	8.80
November	8.04	8.18	8.27	8.28	8.28	8.10	7.40	8.13
December	7.73	7.78	7.78	7.75	7.70	7.55	6.72	7.66
Average, 6 months	8.90	9.04	9.10	9.05	8.92	8.64	7.64	8.42
1931								
January	7.66	7.62	7.54	7.40	7.20	6.99	6.17	7.33
February	7.09	7.05	6.92	6.70	6.46	6.22	5.58	6.58
March	7.31	7.34	7.33	7.21	7.05	6.84	6.14	7.02
April	7.20	7.21	7.17	7.03	6.82	6.56	5.94	6.80
May	6.38	6.38	6.34	6.19	5.95	5.65	4.97	5.93
June	6.46	6.48	6.46	6.35	6.08	5.80	5.06	5.98
July	7.03	7.03	7.05	6.64	6.00	5.50	4.79	5.81
August	6.65	6.66	6.62	6.25	5.55	5.11	4.56	5.29
September	5.43	5.56	5.56	5.50	5.12	4.70	4.10	4.77
October	4.75	4.92	4.94	4.94	4.88	4.74	4.32	4.65
November	4.31	4.39	4.41	4.40	4.39	4.38	4.06	4.29
December	3.87	3.93	3.92	3.91	3.88	3.86	3.55	3.84
Average	6.18	6.21	6.19	6.04	5.78	5.53	4.94	5.73

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-producing service of the bureau. Earlier data in 1927 Yearbook, pp. 1012–1014 and in 1931 Yearbook, p. 852.

TABLE 339.—*Hogs: Slaughter in specified countries, 1921–1931*

Year	United States, Federal inspected	Canada, total	Germany, inspected slaughter	Denmark, in export slaughter houses	England and Wales, sold off farms for slaughter[1]	Scotland, sold off farms for slaughter[1]	Ireland, purchased by Irish bacon curers	Netherlands, receipts at 21 markets
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
1921	38, 982	5, 297	6, 825	1, 641	3, 471	173	1, 030	1, 362
1922	43, 114	5, 382	6, 923	2, 215	3, 229	176	926	865
1923	53, 334	6, 056	5, 830	3, 414	3, 691	245	955	906
1924	52, 873	6, 625	10, 527	4, 024	4, 500	242	1, 110	1, 068
1925	43, 043	5, 720	12, 090	3, 766	3, 588	----------	911	1, 045
1926	40, 636	5, 636	13, 072	3, 838	3, 074	----------	910	1, 025
1927	43, 633	5, 965	17, 279	5, 098	3, 680	----------	1, 050	1, 151
1928	49, 795	5, 880	19, 391	5, 373	4, 109	----------	1, 264	1, 068
1929	48, 445	5, 747	17, 252	4, 994	3, 244	----------	1, 142	1, 046
1930	44, 266	5, 248	17, 994	6, 132	3, 219	----------	1, 037	----------
1931	44, 772	(2)	20, 488	7, 343	----------	----------	1, 102	----------

Bureau of Agricultural Economics. Compiled from official sources and cabled reports from agricultural representatives abroad.

1 For years ended May 31 following.
2 Inspected slaughter, only, was estimated at 2,234,000 in 1931 compared with 2,194,000 in 1930.

TABLE 340.—*Lard and pork: Stocks in cold-storage warehouses and meat-packing establishments, United States, 1922–1931* [1]

Product and year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Lard:												
1922	47, 541	61, 202	61, 297	86, 031	96, 055	123, 798	154, 254	143, 084	119, 755	75, 338	36, 750	32, 506
1923	48, 808	56, 266	59, 101	66, 743	85, 251	84, 530	123, 896	143, 579	115, 860	72, 608	35, 225	35, 327
1924	49, 340	54, 130	68, 610	85, 722	102, 317	127, 949	152, 520	149, 672	124, 676	84, 198	31, 706	35, 713
1925	61, 049	112, 704	151, 927	150, 182	151, 499	138, 295	145, 919	145, 924	114, 724	71, 626	37, 256	33, 710
1926	42, 478	64, 187	76, 145	93, 108	98, 365	106, 824	120, 527	153, 572	151, 233	105, 558	72, 355	46, 744
1927	49, 992	69, 576	77, 103	92, 069	99, 611	111, 976	147, 318	179, 136	167, 018	118, 174	72, 121	46, 154
1928	54, 855	84, 007	121, 082	164, 506	173, 088	186, 073	214, 479	204, 939	177, 888	126, 890	83, 474	67, 257
1929	85, 217	140, 526	173, 864	179, 428	184, 748	183, 490	199, 699	203, 010	180, 085	153, 690	99, 845	68, 517
1930	82, 098	92, 171	111, 914	105, 067	104, 905	115, 270	120, 322	118, 353	88, 868	59, 732	36, 211	31, 582
1931	51, 434	62, 624	74, 977	78, 249	95, 693	103, 366	115, 561	121, 926	96, 047	69, 296	39, 766	34, 824
Dry salt cured and in process of cure:												
1922	111, 071	128, 690	139, 281	145, 183	142, 030	157, 689	186, 948	179, 856	165, 668	122, 783	85, 671	83, 017
1923	121, 125	155, 922	178, 024	206, 429	227, 728	214, 453	217, 862	221, 716	191, 711	146, 974	108, 850	110, 824
1924	148, 121	167, 507	178, 258	192, 934	191, 882	206, 009	212, 158	202, 618	180, 127	135, 702	81, 460	78, 871
1925	118, 718	136, 125	150, 819	142, 950	145, 548	142, 292	162, 518	164, 374	152, 555	128, 599	106, 011	96, 746
1926	119, 617	138, 005	144, 071	151, 286	140, 324	136, 801	148, 164	168, 882	172, 766	143, 572	98, 521	66, 765
1927	68, 203	86, 135	101, 156	124, 676	129, 637	143, 143	173, 256	185, 920	178, 107	140, 420	100, 922	77, 240
1928	97, 335	119, 751	160, 609	178, 012	173, 652	169, 663	174, 906	164, 473	156, 462	125, 899	101, 123	102, 440
1929	143, 011	167, 561	179, 776	178, 595	185, 580	171, 450	163, 805	172, 308	160, 519	139, 256	111, 092	88, 782
1930	107, 782	116, 288	123, 740	115, 653	110, 303	105, 913	108, 171	114, 095	97, 237	71, 143	43, 194	48, 931
1931	70, 188	108, 394	129, 278	141, 225	147. 995	148, 682	154, 949	168, 505	153, 507	116, 180	79, 453	63, 121
Pickled,[2] cured, and in process of cure:												
1922	252, 822	284, 487	321, 950	347, 276	348, 305	363, 395	391, 474	385, 692	369, 187	313, 517	278, 812	302, 708
1923	377, 107	412, 806	451, 279	469, 130	499, 119	483, 673	473, 569	449, 441	413, 798	367, 374	325, 456	384, 604
1924	434, 030	468, 892	500, 784	512, 190	500, 683	483, 372	473, 914	443, 918	408, 928	351, 485	283, 710	299, 868
1925	398, 521	443, 025	483, 302	468, 099	467, 395	425, 481	407, 610	373, 227	338, 156	284, 485	256, 684	261, 128
1926	294, 642	319, 726	345, 661	346, 049	338, 905	320, 305	333, 305	340, 687	330, 326	293, 106	257, 726	266, 222
1927	306, 904	352, 681	392, 642	420, 037	435, 967	432, 965	450, 172	440, 744	407, 239	341, 460	289, 553	276, 916
1928	320, 436	370, 916	461, 264	496, 322	480, 069	459, 878	454, 826	408, 994	351, 936	285, 309	265, 988	292, 626
1929	375, 217	424, 921	473, 916	453, 612	452, 868	443, 044	430, 317	412, 649	382, 750	342, 038	304, 400	316, 180
1930	368, 126	392, 123	443, 882	430, 926	411, 705	392, 403	396, 810	380, 182	329, 074	283, 979	249, 485	285, 636
1931	328, 010	402, 448	453, 042	431, 926	453, 038	434, 324	403, 908	362, 423	311, 985	277, 148	247, 986	264, 205
Frozen:												
1922	51, 203	71, 722	86, 219	98, 765	103, 907	114, 571	128, 962	117, 903	84, 815	46, 796	30, 688	33, 774
1923	72, 278	120, 196	154, 377	189, 115	213, 224	210, 645	217, 074	195, 002	148, 753	98, 795	71, 640	82, 068
1924	126, 718	164, 491	199, 044	227, 284	215, 767	201, 728	186, 566	164, 049	121, 816	77, 986	42, 561	48, 781
1925	130, 125	199, 642	231, 234	218, 508	201, 246	180, 645	168, 527	131, 935	93, 078	54, 294	29, 910	27, 153
1926	57, 960	98, 311	120, 115	129, 259	124, 569	117, 366	120, 707	133, 104	119, 994	77, 673	49, 376	55, 241
1927	97, 650	150, 255	177, 876	193, 733	204, 608	211, 742	220, 847	214, 607	181, 072	126, 887	76, 644	65, 666
1928	105, 654	164, 971	264, 043	323, 403	306, 951	289, 825	285, 628	245, 714	173, 617	103, 879	66, 049	66, 696
1929	151, 811	245, 798	291, 050	289, 754	285, 110	256, 291	247, 815	229, 397	176, 131	119, 204	75, 910	84, 667
1930	145, 078	178, 695	217, 942	206, 417	189, 692	176, 851	174, 240	157, 167	124, 648	92, 305	64, 127	77, 137
1931	122, 994	215, 422	271, 088	270, 520	266, 491	244, 745	215, 794	180, 883	129, 571	81, 559	53, 456	69, 237

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

1 Lard includes all prime steam, kettle-rendered, neutral, and other pure lards. It does not include lard substitutes nor compounds.
2 Pickled pork includes sweet-pickled, plain-brine, and barreled pork.

TABLE 341.—*Pork and pork products: International trade, average 1925–1929, annual 1928–1930*

Country	Calendar year							
	Average 1925–1929		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
United States	1, 136, 856	10, 459	1, 101, 968	12, 866	1, 208, 089	8, 514	949, 730	4, 655
Denmark	557, 264	2, 869	650, 462	2, 713	596, 417	2, 695	738, 248	2, 784
Netherlands	249, 396	15, 089	274, 177	15, 623	202, 634	8, 166	210, 205	5, 225
Irish Free State	92, 656	55, 011	115, 957	48, 509	95, 774	50, 579	81, 312	55, 661
Canada	90, 757	17, 247	53, 357	15, 227	40, 462	21, 982	20, 651	21, 398
Sweden	41, 205	9, 796	51, 426	6, 863	44, 693	7, 894	63, 960	6, 591
Poland	40, 987	37, 151	46, 987	57, 292	21, 962	44, 420	17, 124	30, 805
Hungary	26, 512	84	10, 605	85	14, 074	3	21, 833	0
New Zealand	13, 177	35	18, 893	6	19, 788	5	16, 846	2
China	12, 824	413	10, 089	442	12, 020	343	10, 586	278
Argentina	9, 319	42	10, 874	40	13, 456	32	12, 493	31
Australia [2]	3, 374	2, 119	3, 052	3, 181	3, 219	3, 115	3, 375	829
Total	2, 274, 327	150, 315	2, 347, 847	162, 847	2, 272, 588	147, 748	2, 146, 363	128, 259
PRINCIPAL IMPORTING COUNTRIES								
United Kingdom	5, 883	1, 371, 607	6, 256	1, 431, 846	5, 432	1, 396, 908	5, 102	1, 477, 216
Germany	4, 584	322, 127	4, 832	240, 873	6, 159	275, 581	13, 735	237, 707
Cuba	0	130, 313	0	130, 418	0	123, 812	0	101, 265
France	3, 135	88, 097	3, 229	101, 821	1, 739	57, 866	1, 602	79, 709
Czechoslovakia	4, 018	81, 017	3, 263	71, 629	4, 802	84, 792	2, 573	60, 435
Mexico	[3] 14	45, 127	8	63, 841	--------	676	5	77, 390
Austria	673	33, 382	404	31, 093	280	39, 304	316	23, 337
Belgium	7, 184	22, 099	6, 810	19, 935	3, 932	35, 807	3, 087	34, 592
Italy	3, 212	16, 850	1, 108	30, 147	1, 179	28, 812	2, 059	11, 055
Finland	379	12, 024	181	13, 865	330	11, 352	751	7, 271
Peru	6	11, 692	0	9, 405	10	9, 464	--------	--------
Norway	17	8, 285	4	8, 298	58	6, 734	--------	3, 817
Philippine Islands	0	7, 015	0	7, 359	0	8, 203	0	6, 810
Switzerland	188	6, 765	37	6, 496	30	7, 528	21	4, 913
Brazil	940	2, 569	1, 928	636	1, 608	682	1, 712	888
Spain	1, 803	2, 484	761	3, 561	892	4, 479	2, 951	540
Union of South Africa	747	1, 398	617	1, 476	635	1, 482	618	1, 175
Chile	[3] 199	473	94	254	437	181	--------	--------
Total	32, 982	2, 163, 324	29, 532	2, 172, 953	27, 523	2, 093, 663	34, 532	2, 128, 210

Bureau of Agricultural Economics. Official sources except where otherwise noted. These figures comprise: Pork fresh, canned, pickled, smoked, bacon, Cumberland sides, Wiltshire sides, hams and shoulders, lard, lard compound, neutral lard, hog casings, lard oil, heads and feet.

[1] Preliminary. [2] Year ended June 30. [3] 4-year average.

TABLE 342.—*Lard: International trade, average 1925–1929, annual 1927–1930*

Country	Calendar year: Average 1925–1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
United States	731, 629	0	681, 303	0	759, 722	0	829, 329	0	642, 486	0
Netherlands	64, 693	6, 748	74, 652	9, 928	65, 244	11, 619	49, 112	4, 727	39, 619	2, 831
Denmark	25, 954	1, 383	29, 213	1, 350	30, 851	1, 315	28, 434	1, 258	38, 102	1, 376
China	10, 672	0	8, 659	0	8, 229	0	9, 880	0	8, 458	0
Hungary	9, 618	15	9, 932	2	3, 785	69	2, 863	0	9, 183	0
Canada	4, 020	1, 462	4, 845	739	1, 003	1, 183	1, 504	297	175	1, 656
Irish Free State	3, 852	699	3, 921	609	4, 491	625	3, 794	879	6, 170	2, 198
Madagascar	1, 998	2	1, 180	2	2, 140	6	1, 353	1	1, 514	0
Australia [2]	1, 550	413	1, 316	575	1, 360	712	1, 599	421	970	206
Total	853, 986	10, 722	815, 021	13, 205	876, 825	15, 529	927, 868	7, 583	746, 677	8, 267
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom	912	267, 191	878	267, 501	959	272, 469	524	292, 681	739	279, 444
Germany	857	216, 643	[3] 705	213, 283	[3] 891	192, 956	[3] 483	212, 780	[3] 267	177, 180
Cuba	0	87, 352	0	87, 935	0	86, 885	0	81, 025	0	69, 035
Czechoslovakia	52	66, 159	6	62, 354	12	60, 247	2	66, 499	8	52, 630
Austria	672	33, 151	906	27, 474	403	30, 839	280	39, 036	25	22, 334
France	500	32, 856	394	48, 750	359	29, 278	465	28, 302	494	17, 443
Poland	47	30, 326	11	33, 443	109	44, 601	31	35, 143	22	26, 549
Belgium	2, 205	16, 257	2, 974	16, 034	2, 049	14, 168	3, 379	19, 268	1, 947	13, 984
Peru	6	11, 692	18	11, 999	0	9, 406	10	9, 464	0	------
Italy	820	7, 523	726	4, 891	156	11, 651	259	11, 902	256	5, 324
Finland	54	6, 758	0	6, 113	0	7, 837	0	6, 284	0	5, 277
Switzerland	21	6, 031	15	5, 818	14	5, 638	13	6, 783	10	3, 908
Dominican Republic	0	4, 883	0	4, 483	0	5, 373	0	6, 284	0	4, 058
Philippine Islands	0	4, 799	0	5, 225	0	4, 896	0	5, 859	0	4, 706
British Malaya	1, 151	3, 832	1, 071	3, 517	1, 346	4, 083	824	3, 526	815	2, 399
Sweden	1, 327	2, 843	2, 403	2, 080	1, 601	2, 381	1, 339	2, 182	2, 560	1, 602
Brazil	231	2, 312	175	232	45	335	856	372	986	654
Norway	1	1, 945	1	2, 092	0	1, 777	0	1, 496	0	1, 173
Yugoslavia	936	1, 501	1, 540	142	88	677	15	3, 280	262	201
Total	9, 792	804, 054	11, 823	803, 366	8, 032	785, 497	8, 480	832, 166	8, 391	687, 901

Bureau of Agricultural Economics. Official sources.

[1] Preliminary.
[2] Year ended June 30.
[3] Includes oleomargarine.

TABLE 343.—*Lard, refined: Average price per 100 pounds, Chicago, by months, 1922–1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	Dolls.	*Dolls*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922	11.19	12.59	13.50	12.62	13.15	13.22	13.06	13.30	13.00	14.12	13.78	13.31	13.07
1923	13.20	13.25	13.87	13.42	13.12	13.18	12.84	12.83	15.06	15.22	15.72	15.04	13.90
1924	14.52	13.03	12.84	12.50	12.19	12.13	13.65	15.94	16.25	18.05	16.68	18.00	14.65
1925	17.59	17.03	18.25	17.07	16.50	18.13	18.42	18.94	18.95	18.75	18.50	16.67	17.90
1926	16.81	16.44	16.70	16.75	17.13	18.48	18.00	17.38	17.50	16.75	15.75	15.25	16.91
1927	13.59	13.72	14.38	14.32	14.12	13.35	12.25	12.54	14.25	14.50	13.60	13.25	13.66
1928	12.50	11.60	11.50	12.50	13.10	13.50	14.00	14.70	15.25	14.40	13.62	12.88	13.30
1929	12.75	12.75	13.31	13.25	12.85	12.85	13.22	13.56	13.81	13.17	12.21	11.94	12.97
1930	11.45	12.38	12.12	11.65	11.50	11.00	10.50	12.44	14.25	13.94	12.31	10.70	12.02
1931	9.62	8.94	10.00	10.00	9.50	9.53	8.65	8.32	9.00	8.58	8.47	7.65	9.02

Bureau of Agricultural Economics. Compiled from data of the livestock and meat reporting service of the bureau. Beginning January, 1927, prices represent refined lard in hardwood tubs, earlier prices represent pure lard in tierces. Prices 1905 to December, 1921, available in 1927 Yearbook, p. 1018.

TABLE 344.—*Lard, American prime western steam: Average price per pound, in tierces, at Liverpool, 1921–1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922	11.3	12.9	13.1	12.8	13.6	13.5	13.2	13.3	12.7	13.2	14.1	13.6	13.1
1923	13.3	13.0	13.7	13.6	12.9	13.0	12.7	12.7	14.0	14.5	15.7	15.1	13.7
1924	14.8	13.1	12.8	12.7	12.3	12.2	13.7	15.8	15.8	18.1	17.2	18.1	14.7
1925	18.0	[1] 17.5	18.7	17.8	17.6	19.1	19.3	19.2	19.2	17.9	17.8	16.6	18.2
1926	17.2	16.5	16.5	16.0	[1] 17.6	18.4	17.8	17.0	16.6	15.8	14.2	14.3	16.5
1927	14.3	14.4	14.4	14.3	14.1	14.4	14.3	13.8	14.6	14.4	14.0	13.5	14.2
1928	13.6	12.9	13.0	13.3	13.4	13.3	13.7	13.9	14.4	13.9	13.4	13.2	13.5
1929	13.4	13.5	13.9	13.5	13.4	13.5	13.9	13.8	13.5	12.7	12.1	11.8	13.2
1930	11.9	12.2	11.8	11.8	11.8	11.3	11.2	12.3	13.2	13.2	12.5	11.3	12.0
1931	------	9.8	10.5	10.3	9.5	10.0	9.5	8.8	8.7	9.0	8.2	7.3	[2] 9.2

Bureau of Agricultural Economics. Compiled from Manchester Guardian. An average of Friday quotations. Converted at monthly average rate of exchange as given in Federal Reserve Bulletins to 1925, inclusive; subsequently at par of exchange.

[1] 2 quotations only. [2] Average for 11 months.

TABLE 345.—*Bacon, Wiltshire sides,[1] green, firsts: Average price per pound at Bristol, England, 1909–1931*

Year	American	Danish	Irish	British	Year	American	Danish	Irish	British
	Cents	*Cents*	*Cents*	*Cents*		*Cents*	*Cents*	*Cents*	*Cents*
1909	13.6	15.0	15.9	16.7	1921	21.8	32.8	34.7	36.2
1910	15.2	15.9	16.6	17.8	1922	21.2	29.7	32.5	33.3
1911	12.8	14.3	14.8	15.8	1923	17.5	23.6	25.8	27.0
1912	13.8	15.9	15.8	16.3	1924	16.6	21.3	22.8	23.5
1913	15.8	17.1	17.4	18.4	1925	23.0	27.5	29.7	30.0
1914	15.5	16.4	17.6	18.2	1926	[2] 23.5	27.8	30.6	32.3
1915	17.0	20.4	20.8	21.4	1927	[3] 17.8	21.1	25.5	26.9
1916	19.8	24.0	24.7	26.0	1928	17.9	21.2	23.7	25.8
1917	30.1	-------	33.0	33.6	1929	[4] 21.9	24.5	26.6	28.3
1918	38.5	-------	-------	30.3	1930	19.3	20.8	25.1	27.6
1919	37.1	-------	38.4	38.4	1931	13.9	13.1	18.7	19.5
1920	31.6	34.2	41.7	42.8					

Bureau of Agricultural Economics. Compiled from Agricultural Market Report, Ministry of Agriculture and Fisheries, Great Britain. Average for the last week of each month 1909–1923. Average of weekly averages 1924–1931. Converted at monthly average rate of exchange as given in Federal Reserve Bulletins to December, 1925, inclusive; subsequently at par of exchange. Prices of Canadian bacon are given for the years 1909–1925 in Table 393, 1931 Yearbook; these prices have not been quoted for later years by the Ministry of Agriculture and Fisheries.

[1] Entire half of hog in one piece, head off, back bone out, ribs in.
[2] Average for 11 months.
[3] Average for 5 months.
[4] Average for 9 months.

TABLE 346.—*Hogs: Cholera-control work by Bureau of Animal Industry, 1918–19 to 1930–31*

Year beginning July	Bureau veterinarians engaged in work [1]	Premises investigated	Demonstrations		Autopsies performed	Farms quarantined or carded	Farms cleaned and disinfected	Outbreaks reported
			Number	Hogs treated				
1918-19	180	93,512	----------	233,987	53,586	9,564	4,382	12,336
1919–20	140	46,145	3,037	347,702	10,963	6,129	2,099	9,788
1920–21	54	29,433	3,420	67,295	3,888	2,268	656	7,951
1921–22	80	47,137	4,343	88,846	5,390	1,401	439	7,920
1922–23	71	52,348	5,234	108,562	5,247	1,772	741	7,204
1923–24	45	29,443	3,178	78,007	3,686	1,634	847	7,225
1924–25	34	24,060	2,353	51,331	2,383	886	470	3,437
1925–26	35	20,599	2,579	69,230	2,446	854	247	4,558
1926–27	36.96	25,004	4,863	97,917	3,741	1,832	744	11,555
1927–28	38.42	25,156	4,444	106,906	3,368	1,117	522	6,941
1928–29	37.41	28,939	2,648	56,023	3,326	1,481	489	7,029
1929–30	36.5	26,858	1,740	35,158	2,505	677	345	4,162
1930–31	35.43	23,226	1,460	29,152	3,011	372	380	3,388

Bureau of Animal Industry.

[1] Fractions in the number of veterinarians engaged denote part time devoted to hog-cholera-control work.

TABLE 347.—*Hogs: Shipments, slaughter, value of production and income, by States, 1930*

State and division	Shipments and local slaughter		Inshipments, stocker, feeding and breeding		Farm slaughter		Value of amount consumed on farms	Receipts from sales	Gross income	Value of production
	Head	Total weight	Head	Total weight	Head	Total weight				
	Thousands	*1,000 pounds*	*Thousands*	*1,000 pounds*	*Thousands*	*1,000 pounds*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
Maine	28	7,280	1	100	31	8,370	427	1,249	1,676	1,502
New Hampshire	13	3,380	2	200	12	3,240	143	507	650	551
Vermont	12	3,120	-----	--------	36	9,360	423	919	1,342	1,147
Massachusetts	90	23,400	11	1,100	27	7,020	337	2,562	2,899	2,704
Rhode Island	6	1,500	-----	--------	4	1,000	55	237	292	264
Connecticut	12	3,120	-----	--------	20	5,200	289	681	970	898
New York	112	25,760	2	200	205	48,790	2,603	5,246	7,849	6,577
New Jersey	61	12,200	27	3,375	45	10,350	663	1,427	2,090	2,013
Pennsylvania	335	77,050	3	300	450	112,500	7,688	12,747	20,435	18,740
North Atlantic	669	156,810	46	5,275	830	205,830	12,628	25,575	38,203	34,396
Ohio	2,171	488,475	8	880	670	167,500	13,698	48,482	62,180	59,580
Indiana	3,348	770,040	16	1,920	550	137,500	12,020	73,351	85,371	82,929
Illinois	5,152	1,231,848	28	3,220	620	155,000	12,694	113,591	126,285	125,830
Michigan	618	126,690	17	1,700	260	62,400	3,691	13,932	17,623	15,792
Wisconsin	1,880	423,000	1	100	460	103,500	7,203	39,132	46,335	46,449
North Central, East	13,169	3,040,053	70	7,820	2,560	625,900	49,306	288,488	337,794	330,580
Minnesota	4,676	1,028,720	36	3,600	410	90,200	6,748	90,561	97,309	97,799
Iowa	12,161	2,858,485	81	9,315	501	115,230	9,824	247,999	257,823	265,074
Missouri	4,087	919,575	31	3,410	813	199,185	15,950	82,623	98,573	95,392
North Dakota	790	181,700	1	100	210	46,200	3,322	14,771	18,093	18,518
South Dakota	3,230	742,900	8	920	160	37,600	3,000	62,518	65,518	66,846
Nebraska	5,468	1,388,872	25	2,500	282	71,628	6,045	120,820	126,865	127,779
Kansas	3,100	698,625	46	5,290	374	93,500	7,652	61,683	69,335	68,043
North Central, West	33,512	7,818,877	228	25,135	2,750	653,543	52,541	680,975	733,516	739,451
North Central	46,681	10,858,930	298	32,955	5,310	1,279,443	101,847	969,463	1,071,310	1,070,031
Delaware	23	4,370	-----	--------	15	3,000	185	594	779	724
Maryland	110	17,600	-----	--------	140	33,600	2,749	2,616	5,365	4,916
Virginia	152	32,180	1	100	494	111,150	8,303	5,097	13,400	12,291
West Virginia	105	17,750	1	100	192	48,000	3,640	2,951	6,591	6,029
North Carolina	165	33,000	-----	--------	769	169,180	14,812	6,797	21,609	21,242
South Carolina	80	16,000	-----	--------	377	81,055	6,857	2,009	8,866	8,632
Georgia	416	64,480	1	100	999	217,782	15,681	7,413	23,094	22,495
Florida	176	24,990	-----	--------	325	45,500	2,129	3,795	5,924	5,329
South Atlantic	1,227	210,370	3	300	3,311	709,267	54,356	31,272	85,628	81,658
Kentucky	450	80,375	12	900	580	145,000	11,480	9,449	20,929	18,878
Tennessee	357	74,540	13	1,625	615	153,750	11,636	8,855	20,491	18,991
Alabama	190	32,400	1	150	642	128,400	8,834	4,447	13,281	11,848
Mississippi	66	9,900	2	280	549	109,800	7,113	2,785	9,898	9,454
Arkansas	164	24,600	1	100	561	112,200	6,900	3,806	10,706	8,882
Louisiana	67	10,050	5	750	308	49,280	3,033	1,622	4,655	4,246
Oklahoma	727	147,400	12	1,200	365	91,250	7,033	12,555	19,588	18,241
Texas	657	138,575	12	1,200	760	197,600	13,737	13,269	27,006	24,927
South Central	2,678	517,840	58	6,205	4,380	987,280	69,766	56,788	126,554	115,467
Montana	235	47,000	-----	--------	124	27,280	1,825	4,885	6,710	6,331
Idaho	233	44,270	-----	--------	67	16,080	1,258	4,295	5,553	5,617
Wyoming	111	21,090	-----	--------	35	8,050	535	1,860	2,395	2,360
Colorado	502	113,875	5	500	96	23,040	1,663	10,299	11,962	12,167
New Mexico	41	8,200	-----	--------	31	6,200	407	756	1,163	1,053
Arizona	17	3,400	-----	--------	10	1,900	117	423	540	519
Utah	61	9,150	2	200	39	7,800	516	988	1,504	1,363
Nevada	27	4,980	1	100	15	3,000	224	498	722	739
Washington	146	30,990	18	1,800	109	23,980	1,329	4,221	5,550	5,112
Oregon	199	39,830	18	2,160	94	19,740	1,142	4,690	5,832	5,467
California	555	101,200	3	300	110	22,000	1,584	10,887	12,471	11,750
Western	2,127	423,985	47	5,060	730	159,070	10,600	43,802	54,402	52,478
United States	53,382	12,167,935	452	49,795	14,561	3,340,890	249,197	1,126,900	1,376,097	1,354,030

Bureau of Agricultural Economics. Estimates Division of Crop and Livestock Estimates. Subject to revision. For the five-year average 1924–28 see 1931 Yearbook Table 395. The figures on income and value of production as shown in Table 455 are computed from the data shown in this table. The difference between gross income and value of production arises from the fact that in computing value of production allowance is made for changes in inventory numbers at the beginning and end of the year while in computing income these changes are not used.

TABLE 348.—*Sheep and lambs: Number on farms and value per head in the United States, 1840, 1850, 1860, 1867–1932*

Year	Sheep on farms		Year	Sheep on farms	
	Number [1]	Value per head Jan. 1		Number [1]	Value per head Jan. 1
	Thousands	*Dollars*		*Thousands*	*Dollars*
1840 [2]	*19,311*		1900 [3]	41,883	
1850 [2]	*21,723*		1900 [2]	*61,504*	
1860 [2]	*22,471*		1900	44,573	2.93
1867	39,385	2.50	1901	46,155	2.98
1868	38,992	1.82	1902	46,667	2.65
1869	37,724	1.64	1903	45,180	2.63
1870 [2]	*28,478*		1904	42,439	2.59
1870	40,853	1.96	1905	40,268	2.82
1871	31,851	2.14	1906	42,454	3.54
1872	31,679	2.61	1907	44,518	3.84
1873	33,002	2.71	1908	46,557	3.88
1874	33,938	2.43	1909	48,382	3.43
1875	33,784	2.55	1910 [2]	*52,448*	
1876	35,935	2.37	1910	47,072	4.12
1877	35,804	2.13	1911	47,349	3.91
1878	35,740	2.21	1912	43,279	3.46
1879	38,124	2.07	1913	40,700	3.94
1880 [2]	*35,192*		1914	37,773	4.02
1880	40,766	2.21	1915	36,287	4.50
1881	43,570	2.39	1916	36,543	5.17
1882	45,016	2.37	1917	36,700	7.13
1883	49,237	2.53	1918	39,000	11.82
1884	50,627	2.37	1919	41,000	11.63
1885	50,360	2.14	1920 [2]	*35,034*	
1886	48,322	1.91	1920	40,643	10.45
1887	44,759	2.01	1921	39,378	6.27
1888	43,545	2.05	1922	36,821	4.79
1889	42,599	2.13	1923	36,695	7.49
1890 [2]	*35,935*		1924	37,020	7.88
1890	44,336	2.27	1925 [2]	*35,590*	
1891	43,431	2.50	1925	38,392	9.68
1892	44,938	2.58	1926	40,183	10.48
1893	47,274	2.66	1927	42,302	9.67
1894	45,048	1.98	1928	45,121	10.22
1895	42,294	1.58	1929	48,249	10.59
1896	38,299	1.70	1930 [2]	*56,983*	
1897	36,819	1.82	1930	51,383	8.94
1898	37,657	2.46	1931	52,745	5.35
1899	39,114	2.75	1932 [4]	53,912	3.40

Bureau of Agricultural Economics. Estimates of the crop reporting board. Revisions for the years 1920–1931 were made January, 1932.

[1] Prior to 1900 estimates for each 10-year period represent an index of annual changes applied to census as base on first report after census data were available. Figures for 1900–1919 are tentative revised estimates of the Bureau of Agricultural Economics as first published in 1927 Yearbook.

[2] Italic figures are from the census. Figures for census years 1860, 1880, and 1890 exclude an estimated number of unenumerated sheep on ranges, as follows: 1860, 1,505,810; 1880, 7,000,000; 1890, 4,940,948. Censuses prior to 1900 excluded lambs. Census dates were June 1 from 1840 to 1900; Apr. 15, 1910; Jan. 1, 1920 and 1925; and Apr. 1, 1930. 1900, 1910 and 1930 include spring-born lambs.

[3] Original estimate of the Bureau of Agricultural Economics.

[4] Preliminary.

TABLE 349.—*Sheep and lambs: Estimated number on farms and value per head, by States, January 1, 1928-1932*

State and division	Number					Value per head [1]				
	1928 [2]	1929 [2]	1930 [2]	1931 [2]	1932 [3]	1928	1929	1930	1931	1932
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Maine	92	84	83	85	81	8.50	8.40	8.60	5.70	3.50
New Hampshire	21	19	20	19	18	9.50	9.60	9.40	6.20	4.50
Vermont	44	43	42	41	39	9.30	9.00	9.30	5.70	3.90
Massachusetts	11	11	12	11	10	10.60	10.00	9.60	7.30	4.50
Rhode Island	2	2	2	2	2	10.50	11.00	11.50	7.50	4.50
Connecticut	9	9	10	11	10	10.80	11.90	10.90	7.50	4.70
New York	516	518	520	489	473	11.10	11.40	10.50	6.20	4.40
New Jersey	6	7	7	8	7	12.20	11.50	11.60	7.50	5.40
Pennsylvania	437	441	467	481	491	9.50	9.60	9.60	5.90	4.40
North Atlantic	1,138	1,134	1,163	1,147	1,131	10.17	10.35	9.95	6.05	4.34
Ohio	2,005	2,005	2,105	2,000	2,164	8.90	9.00	8.50	4.60	3.50
Indiana	714	741	781	809	826	11.00	11.20	10.50	5.70	4.00
Illinois	630	680	709	719	799	10.60	10.80	10.00	5.90	3.80
Michigan	1,263	1,334	1,304	1,213	1,285	10.90	10.90	10.10	5.20	3.90
Wisconsin	444	459	517	529	546	10.20	10.40	9.00	5.30	3.20
North Central East	5,056	5,219	5,416	5,270	5,620	10.02	10.16	9.42	5.13	3.67
Minnesota	666	772	910	1,027	1,084	10.50	10.80	9.60	5.10	3.20
Iowa	983	1085	1,230	1,313	1,398	10.80	11.00	9.90	5.50	3.30
Missouri	942	1,131	1,180	1,204	1,205	10.10	10.70	9.10	5.00	3.30
North Dakota	549	672	802	940	1,040	10.80	11.10	9.70	5.00	3.30
South Dakota	863	1,001	1,189	1,332	1,465	10.60	10.60	9.00	5.00	3.30
Nebraska	905	1,050	1,208	960	1,047	9.10	9.50	8.20	4.70	3.00
Kansas	512	632	659	669	779	9.30	9.20	8.40	4.50	3.10
North Central West	5,420	6,343	7,178	7,445	8,018	10.18	10.44	9.12	5.04	3.22
North Central	10,476	11,562	12,594	12,715	13,638	10.11	10.31	9.25	5.07	3.41
Delaware	3	3	4	4	4	12.00	11.50	11.80	7.00	5.00
Maryland	104	111	113	111	108	11.60	11.50	11.50	6.90	5.10
Virginia	437	468	490	495	485	11.50	11.80	11.00	6.70	4.60
West Virginia	536	574	601	625	657	11.10	11.40	9.90	5.90	4.40
North Carolina	85	94	88	90	91	9.10	9.10	8.70	5.80	3.90
South Carolina	15	15	14	14	14	4.90	4.90	4.90	4.60	3.70
Georgia	41	39	38	38	37	3.80	4.00	4.20	3.90	2.30
Florida	53	50	45	44	43	3.60	4.30	4.10	3.30	2.40
South Atlantic	1,274	1,354	1,393	1,421	1,439	10.53	10.84	9.96	6.08	4.35
Kentucky	895	910	915	875	875	11.20	11.40	10.40	6.50	4.70
Tennessee	345	352	364	382	393	9.70	9.80	9.60	5.80	4.00
Alabama	60	63	56	50	50	4.40	4.20	4.40	3.40	2.60
Mississippi	88	90	91	91	100	3.40	3.30	3.50	2.90	2.00
Arkansas	55	54	54	56	59	6.10	6.50	5.90	3.30	2.60
Louisiana	129	139	135	133	140	3.00	3.30	3.40	2.70	2.70
Oklahoma	130	160	185	174	164	8.60	9.90	8.90	4.60	3.00
Texas	5,047	5,703	6,387	6,834	7,312	8.40	8.80	7.10	4.20	2.90
South Central	6,749	7,471	8,187	8,595	9,093	8.62	8.96	7.49	4.45	3.11
Montana	3,400	3,854	4,120	4,244	3,820	11.10	11.40	9.40	5.10	3.20
Idaho	2,100	2,230	2,280	2,394	2,274	11.40	11.90	9.80	6.10	3.60
Wyoming	3,306	3,471	3,540	3,894	4,128	10.60	11.60	9.20	5.80	3.60
Colorado	3,020	3,118	3,750	3,351	3,361	9.60	10.60	9.00	5.60	3.10
New Mexico	2,390	2,385	2,527	2,780	3,058	9.00	10.40	8.10	4.90	2.30
Arizona	1,130	1,107	1,080	1,112	1,190	9.30	9.60	8.00	4.80	2.30
Utah	2,730	2,870	2,900	2,900	2,755	11.20	11.60	9.60	6.40	3.70
Nevada	1,234	1,172	1,088	1,175	1,152	11.00	10.80	9.20	6.30	4.00
Washington	645	700	735	750	750	11.60	12.10	9.70	6.20	4.00
Oregon	2,359	2,501	2,576	2,679	2,679	11.30	11.50	9.00	5.40	3.50
California	3,170	3,320	3,450	3,588	3,444	11.40	10.80	9.10	6.30	4.20
Western	25,484	26,728	28,046	28,867	28,611	10.68	11.16	9.13	5.68	3.40
United States	45,121	48,249	51,383	52,745	53,912	10.22	10.59	8.94	5.35	3.40

Bureau of Agricultural Economics. Estimates of crop-reporting board. Revisions by State, 1920-1927 are published in February, 1932, Crops and Markets.

[1] Sum of total value of classes divided by total number and rounded to nearest dime for States. Division and United States averages not rounded.
[2] Revised January, 1932.
[3] Preliminary.

TABLE 350.—*Sheep: Number in countries having 100,000 and over, average 1921–1925, annual 1926–1931*

Country	Month of estimate	Average 1921–1925 [1]	1926	1927	1928	1929	1930	1931
North America, Central America, and West Indies:		*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
United States	January	37,662	40,183	42,302	45,121	48,249	51,383	52,745
Canada	June	3,027	3,142	3,263	3,416	3,636	3,696	
Mexico	do	[2] 1,362	2,698					
Guatemala		153	148	216	241	189	184	
Cuba						102		
Dominican Republic		148						
Estimated total [3]		42,700						
South America:								
Colombia		776	800	771			810	
Venezuela		113						
Ecuador		(1,000)	700			[4] 1,500		
Peru		11,363				[5] 11,209		
Bolivia	December [6]	3,436	4,200	4,151		5,552		
Chile		4,332	[7] 4,094				6,263	
Brazil	September	[8] 7,933						
Uruguay		[5] 14,443				[4] 19,358	[5] 20,558	
Paraguay	December [6]	(600)						
Argentina	do	[5] 36,209					[5 9] 44,413	
Falkland Islands		649	606	607	631	613		
Estimated total [3]		80,900						
Europe:								
Iceland		565	590	600	627	640		
England and Wales	June	14,385	16,859	17,072	16,390	16,105	16,316	17,745
Isle of Man	do	77	90	91	89	92	96	
Scotland	do	6,827	7,203	7,536	7,579	7,556	7,622	7,697
North Ireland	do	456	529	600	624	654	704	793
Irish Free State	do	2,804	3,003	3,120	3,264	3,375	3,515	3,575
Norway [10]	do	1,380	1,595	1,608	1,654	1,533	1,588	1,692
Sweden	June-September	1,384		708	806		652	
Denmark	July	380	233			193		
Faroe Islands		66						
Netherlands	May-June	668					[5] 485	
Belgium	December [6]	126			[4] 122			
France	do	9,777	10,537	10,775	10,693	10,445	10,452	10,152
Spain	do	19,229	20,067	20,529		[5] 19,370		
Portugal		3,684		[4] 4,450	[4] 4,900	[4] 4,000		
Italy	March-April	12,014	[4] 12,350	[4] 12,500			[5] 9,896	
Switzerland	April	245	169					184
Germany	December [6]	5,889	4,753	4,080	3,819	3,635	3,480	3,501
Austria	do	526					[5] 272	
Czechoslovakia	do	[5 8] 986	861				[5 11] 831	608
Hungary	April	1,661	1,804	1,611	1,566	1,573	1,464	1,440
Yugoslavia	January	7,728	7,933	7,736	7,722	7,736		7,953
Greece	December [6]	5,965	6,636	6,951	6,442	6,920	5,806	
Bulgaria	do	8,186		[7] 8,739	8,427	7,986		
Rumania	do	11,660	12,950	13,116	12,555	12,423	12,092	11,921
Poland	November	2,193		1,918		2,523	2,490	2,594
Lithuania		1,314	1,573	1,410	1,368	1,125	1,097	
Latvia	June	1,240	1,153	1,128	1,090	906	873	923
Estonia	July	654	666	667	659	476	467	
Finland	September	1,526	1,414	1,368	1,319	1,310		
Russia (European and Asiatic).[12]	Summer	93,569	113,865	126,835	133,592	134,000	100,600	
Estimated total excluding Russia.[3]		123,600						
Africa:								
Abyssinia (Ethiopia)		(2,000)				4,000		
Morocco		7,533	9,250	7,712	8,035	8,848	7,357	
Algeria	September	5,943	6,786	5,083	5,614	6,196	7,168	
Libia (Italian)		1,043			822			
Tunis	December [6]	1,794	1,329	2,142	2,142	2,173	2,461	2,976
French West Africa		3,742	4,365	3,968	5,341	5,113	7,458	
French Sudan		2,173		2,400	2,424	2,739	3,000	
Gold Coast		373	325	350	400	400		
Nigeria including British Cameroons.		1,711	1,809	1,827	1,785	2,121	2,478	
Egypt	September	1,013	1,144	1,232	1,180	1,003	1,129	
Anglo-Egyptian Sudan		1,638	2,000	2,201	2,201	2,200	2,200	
British Somaliland		(2,000)	2,000	2,000	1,300	1,700	2,000	
Italian Somaliland	Mar. 31	1,666			[5] 1,039	855	847	

See footnotes at end of table.

TABLE 350.—*Sheep: Number in countries having 100,000 and over, average 1921–1925, annual 1926–1931*—Continued

Country	Month of estimate	Average 1921–1925 [1]	1926	1927	1928	1929	1930	1931
		Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
Africa—Continued.								
Eritrea (Italian) [13]		1,701	------	1,842	[5] 1,879	------	------	------
Kenya Colony	March-June	2,600	2,756	2,805	2,847	2,905	3,228	------
French Cameroon [13]		287	410	456	441	620	664	------
Uganda	December [6]	386	604	866	911	967	806	792
Belgian Congo		304	300	285	270	348	369	------
Ruanda Urundi		150	125	125	110	125	------	------
British Southwest Africa		954	1,069	1,252	1,524	1,497	1,601	------
Bechuanaland		125	132	152	152	------	------	------
Union of South Africa	August	32,561	39,020	40,271	42,662	45,172	[14] 49,240	[14] 51,700
Basutoland		1,954	2,100	2,149	2,100	2,150	2,400	------
Rhodesia, Southern	December [6]	333	349	332	352	359	354	------
Tanganyika Territory [13]		3,893	4,462	4,779	5,062	5,041	5,522	------
Madagascar		110	116	66	142	201	263	------
Estimated total [3]		78,500	------	------	------	------	------	------
Asia:								
Arabia		(3,500)	------	[4] 3,500	------	------	------	------
Cyprus	March	237	207	260	264	273	290	------
Turkey, European and Asiatic.		10,458	12,872	13,632	12,079	10,115	10,398	------
Iraq (Mesopotamia) [13]	February	5,270	5,055	6,136	5,619	6,136	7,153	------
Palestine	March	271	291	243	227	232	253	------
Persia		16,562	16,562	[4] 14,280	[4] 15,000	[4] 16,000	------	------
Syria and Lebanon		1,797	1,400	1,404	2,149	2,540	2,682	------
India, British	December-April	22,412	23,201	23,237	23,350	23,336	[5] 25,540	------
Native States	do	12,299	11,848	12,353	12,156	12,445	[5] 16,259	------
China		[15] 29,700	------	------	------	[16] 35,000	------	------
Philippines	December [6]	260	344	369	368	360	------	------
Dutch East Indies:								
Java and Madura	do	915	------	1,292	------	------	------	------
Outer possessions	do	115	------	121	------	------	------	------
Estimated total exclusive of Russia.[3]		114,100	------	------	------	------	------	------
Oceania:								
Australia	December [6]	85,556	103,563	104,267	100,827	103,431	104,558	106,966
New Zealand	April	23,382	24,905	25,649	27,134	29,051	30,841	29,585
Estimated total [3]		109,000	------	------	------	------	------	------
Total countries reporting all periods including Russia—								
To 1930 (45) [17]		428,938	489,900	508,988	517,876	529,065	516,107	------
To 1931 (16) [17] [18]		237,420	269,990	276,143	280,031	287,248	297,395	304,203
Estimated world total including Russia [3]		642,400	------	------	------	------	------	------

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture unless otherwise stated. Figures in parentheses are interpolated.

[1] Average for 5-year period if available, otherwise for any year or years within this period except as otherwise stated.
[2] Incomplete.
[3] These totals include countries with less than 100,000 interpolations for a few countries not reporting each year and rough estimates for some others.
[4] Unofficial.
[5] Census figures.
[6] Countries reporting as of Dec. 31 are considered as of Jan. 1 of the following year; i. e., figures for number of sheep in France as of Dec. 31, 1925, have been placed in 1926 column.
[7] Year 1925.
[8] Year 1920.
[9] June, 1930.
[10] In rural communities only.
[11] May.
[12] Years 1924–1926. Statistical Review, October, 1928, p. 6. Year 1927. Agricultural Statistics of the U. S. S. R. Lenin Academy, 1927–1930. Planned Economy No. 12, 1930, State Planning Board.
[13] Goats included.
[14] Estimate based on increase reported in June, compared with preceding June.
[15] Estimate based on increase in 1920 in provinces which supported 80 per cent of total in China in 1914.
[16] Average of range from 25,000,000 to 45,000,000.
[17] Comparable totals for number of countries indicated.
[18] Excluding Russia.

TABLE 351.—*Sheep: Receipts and stocker and feeder shipments at all public stockyards, 1922–1931*

RECEIPTS

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
1922	1,835	1,399	1,465	1,227	1,692	1,700	1,677	1,951	2,303	3,311	2,288	1,516	22,364
1923	1,636	1,366	1,430	1,447	1,794	1,426	1,661	1,800	2,659	3,464	1,816	1,526	22,025
1924	1,697	1,412	1,367	1,348	1,344	1,550	1,672	2,005	3,027	3,295	1,879	1,605	22,201
1925	1,467	1,388	1,504	1,541	1,689	1,603	1,699	2,064	2,627	3,198	1,712	1,608	22,100
1926	1,548	1,486	1,694	1,502	1,717	1,913	1,739	2,277	3,279	3,090	1,917	1,706	23,868
1927	1,740	1,501	1,558	1,486	2,013	1,816	1,676	2,209	2,848	3,587	1,896	1,609	23,939
1928	1,705	1,669	1,520	1,591	1,952	1,913	1,898	2,362	3,386	3,938	2,053	1,610	25,597
1929	1,877	1,544	1,527	2,012	2,173	1,752	2,119	2,545	3,355	4,093	2,168	1,703	26,868
1930	1,903	1,803	2,151	2,230	2,334	2,230	2,296	2,583	3,580	3,784	2,607	2,307	29,808
1931	2,175	1,964	2,120	2,713	2,810	2,587	2,535	3,270	3,900	3,956	2,811	2,182	33,023

STOCKER AND FEEDER SHIPMENTS

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1922	183	169	143	97	145	191	204	350	534	1,138	757	256	4,167
1923	171	169	114	82	216	117	188	341	897	1,489	540	154	4,478
1924	149	106	83	105	118	152	226	444	973	1,438	676	206	4,676
1925	138	119	94	109	178	137	193	421	857	1,392	475	219	4,332
1926	155	107	83	124	130	238	260	567	1,093	1,150	493	223	4,623
1927	207	136	140	118	259	257	215	389	943	1,560	497	174	4,895
1928	116	101	95	133	205	278	234	564	1,080	1,466	544	193	5,011
1929	188	115	122	210	218	226	231	639	1,027	1,831	575	183	5,565
1930	126	101	99	134	142	216	206	465	907	1,024	761	282	4,463
1931	184	105	103	189	176	289	243	718	1,104	1,181	655	182	5,129

Bureau of Agricultural Economics. Compiled from data of livestock and meat-reporting service of bureau.

TABLE 352.—*Sheep: Receipts at principal public stockyards and at all public stockyards, 1922–1931*

Year	Chicago	Denver	East St. Louis	Fort Worth	Kansas City	Omaha	South St. Joseph	South St. Paul	Sioux City	Total nine markets [1]	All other stockyards reporting	Total all stockyards reporting [1]
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
1922	3,874	1,867	628	325	1,574	2,533	730	499	223	12,252	10,112	22,364
1923	4,098	1,857	561	386	1,671	2,970	979	454	216	13,191	8,834	22,025
1924	4,192	2,040	489	373	1,569	2,844	1,089	476	310	13,381	8,820	22,201
1925	3,969	2,357	559	314	1,500	2,420	1,143	545	360	13,166	8,934	22,100
1926	4,405	1,826	636	445	1,762	2,780	1,303	773	449	14,378	9,490	23,868
1927	3,829	1,908	574	445	1,616	2,604	1,348	705	527	13,555	10,384	23,939
1928	3,868	2,295	510	458	1,767	3,037	1,580	891	568	14,974	10,623	25,597
1929	3,785	2,290	534	540	1,753	3,031	1,636	1,139	840	15,548	11,320	26,868
1930	4,335	2,062	584	432	2,016	3,410	1,634	1,354	1,188	17,015	12,793	29,808
1931	4,489	2,499	661	1,173	2,244	3,510	1,572	1,690	1,279	19,118	13,905	33,023

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-reporting service of the bureau. Receipts, 1900–1921, are available in 1924 Yearbook, p. 933, Table 540.

[1] Rounded totals of complete figures.

TABLE 353.—*Farm prices of sheep, per head, by ages, United States, January 1, 1912–1932*

Jan. 1—	Under 1 year old	Ewes 1 year and over	Wethers 1 year and over	Rams	Jan. 1—	Under 1 year old	Ewes 1 year and over	Wethers 1 year and over	Rams
	Dollars	*Dollars*	*Dollars*	*Dollars*		*Dollars*	*Dollars*	*Dollars*	*Dollars*
1912	2.64	3.45	3.43	8.26	1923	6.80	7.67	5.90	14.30
1913	3.11	3.98	3.93	8.80	1924	6.97	8.10	5.98	15.55
1914	3.22	4.09	4.06	8.49	1925	8.53	10.02	7.13	16.91
1915	3.62	4.59	4.48	9.01	1926	9.04	11.01	7.32	18.45
1916	4.13	5.35	5.02	10.32	1927	7.91	10.32	6.60	18.73
1917	5.63	7.48	6.78	13.62	1928	8.45	10.86	7.23	19.63
1918	9.06	12.70	11.26	20.84	1929	8.93	11.19	7.64	20.27
1919	8.82	12.44	11.02	21.90	1930	7.85	9.10	6.44	19.63
1920	8.07	11.04	9.64	21.94	1931	4.64	5.43	3.43	12.94
1921	5.33	6.38	5.94	15.13	1932	2.87	3.47	2.38	8.23
1922	4.25	4.83	4.05	11.31					

Bureau of Agricultural Economics. Based on returns from special price reporters. Average price, by States, weighted by estimated numbers each age group.

TABLE 354.—*Sheep: Estimated average price per 100 pounds received by producers, United States, 1922–1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weighted average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922	4.57	5.71	6.51	6.43	6.65	6.09	6.11	5.98	5.70	5.93	6.02	6.27	5.96
1923	6.88	6.83	7.06	7.20	6.92	6.43	6.43	6.22	6.57	6.33	6.20	6.39	6.65
1924	6.71	6.82	7.22	7.45	7.33	7.09	6.60	6.32	6.30	6.32	6.39	6.84	6.81
1925	7.86	8.41	8.20	8.42	7.53	7.04	7.17	7.32	7.27	7.31	7.51	7.79	7.70
1926	7.95	8.20	7.66	7.67	7.78	7.56	7.09	6.92	7.13	6.93	6.75	6.95	7.43
1927	6.87	7.16	7.41	7.40	7.68	7.27	7.16	7.13	7.06	7.05	7.42	7.38	7.26
1928	7.52	7.60	7.85	8.11	8.09	7.84	7.56	7.53	7.58	7.50	7.50	7.29	7.68
1929	7.84	7.98	8.36	8.40	8.09	7.86	7.25	7.32	7.01	6.83	6.75	6.61	7.55
1930	6.91	6.84	6.59	6.44	5.86	5.52	4.65	4.13	4.21	3.93	3.98	3.96	5.36
1931	4.04	4.15	4.24	4.24	3.91	3.28	3.01	3.00	2.80	2.63	2.63	2.52	3.43

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices by States, weighted by number of sheep Jan. 1, to obtain a price for the United States; yearly price obtained by weighting monthly prices by Federal inspected slaughter. For previous data see 1930 or earlier yearbooks.

TABLE 355.—*Lambs: Estimated average price per 100 pounds received by producers, United States, 1922–23 to 1931–32*

Year	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	Weighted average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922–23	9.87	9.55	9.39	9.43	10.06	10.30	10.49	10.69	10.83	11.01	10.69	11.00	10.30
1923–24	10.72	10.60	9.96	10.28	10.17	10.01	10.10	10.19	10.53	11.22	11.32	11.43	10.54
1924–25	11.21	10.50	10.15	10.18	10 35	10.55	10 96	12.69	13.13	13.48	12.22	11.99	11.45
1925–26	11.62	11.71	11.80	11.95	12.04	12.20	12.67	12.79	12.02	11.56	11.32	11.78	11.98
1926–27	12.07	11.52	11.12	11.32	11.31	11.11	10.92	10.65	10.84	11.55	11.97	11.92	11.36
1927–28	11.95	11.44	11.15	11.14	11.22	11.42	11.39	11.34	11.90	12.31	12.73	13.03	11.76
1928–29	13.18	12.25	11.88	11.97	11.57	11.50	11.41	12.23	12.60	13.12	13.36	12.79	12.31
1929–30	12.31	11.90	11.46	11.08	10.97	10.74	10.76	11.10	10.46	9.63	9.02	8.92	10.71
1930–31	9.02	8.08	6.82	6.67	6.15	6.21	6.18	6.30	6.59	6.84	6.94	6.96	6.92
1931–32	6.42	5.60	5.33	5.04	4.64	4.46	4.19	------	------	------	------	------	----------

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices by States, weighted by number of lambs Jan. 1, to obtain a price for the United States; yearly price obtained by weighting monthly prices by receipts at principal markets. For previous data see 1930 or earlier yearbooks.

TABLE 356.—*Sheep and lambs: Average price per 100 pounds at Chicago, by months, 1901–1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average [1]
	SHEEP												
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1901	4.08	4.10	4.60	4.72	4.22	3.68	3.52	3.45	3.32	3.30	3.18	3.45	3.79
1902	4.18	4.70	4.70	5.65	5.70	4.20	3.72	3.55	3.38	3.35	3.32	3.65	4.18
1903	4.12	4.65	5.40	5.05	4.82	4.20	3.48	3.22	3.18	3.18	3.05	3.20	3.96
1904	3.95	4.05	4.50	4.98	5.10	4.45	3.85	3.65	3.50	3.65	4.08	4.58	4.20
1905	5.15	5.55	5.50	5.08	4.75	4.72	5.10	4.95	4.72	5.10	5.10	5.25	5.08
1906	5.40	5.12	5.28	5.35	5.55	5.45	5.25	4.98	5.15	4.90	5.05	5.08	5.21
1907	5.15	5.20	5.50	5.65	5.78	5.90	5.32	5.32	5.18	4.82	4.38	4.18	5.20
1908	4.80	5.10	5.90	5.70	5.40	4.65	4.05	3.80	3.75	4.05	4.20	4.30	4.64
1909	4.90	5.00	5.25	5.65	6.15	5.30	4.70	4.60	4.65	4.30	4.55	4.85	4.99
1910	5.55	6.50	7.60	7.60	6.55	5.10	4.20	4.20	4.25	3.95	3.70	3.90	5.26
1911	4.10	4.15	4.70	4.20	4.45	3.80	3.95	3.50	3.80	3.65	3.45	3.55	3.94
1912	4.30	4.15	5.30	5.90	6.15	4.50	4.25	4.05	4.15	4.00	4.05	4.45	4.60
1913	5.35	5.90	6.40	6.45	5.85	5.05	4.50	4.35	4.30	4.55	4.60	4.95	5.19
1914	5.50	5.70	5.95	6.25	5.65	5.10	5.40	5.55	5.30	5.20	5.65	5.40	5.55
1915	5.80	6.45	7.45	7.70	7.35	5.50	6.05	6.25	5.75	6.00	5.85	6.20	6.36
1916	7.20	7.75	8.25	8.15	8.20	7.35	7.25	7.35	7.80	7.50	8.00	9.00	7.82
1917	10.00	11.25	11.70	12.10	13.00	10.00	9.10	9.75	11.15	11.65	11.25	11.50	11.04
1918	12.20	12.35	13.60	15.65	14.75	13.40	12.65	13.15	11.80	10.45	9.85	9.40	12.44
1919	10.35	11.25	14.05	14.50	12.25	8.30	9.70	9.75	8.30	8.15	8.30	9.60	10.47
1920	11.80	13.35	13.40	14.25	12.25	8.50	8.90	7.70	6.85	6.45	5.75	4.70	9.49
1921	5.07	4.90	6.14	6.58	6.33	4.46	5.08	4.53	4.49	4.71	4.40	4.92	5.13
1922	7.26	8.28	9.17	9.33	7.35	5.59	6.12	5.63	6.05	6.25	7.48	7.28	7.15
1923	7.72	8.08	8.64	8.90	6.74	5.00	5.16	7.09	7.25	6.35	6.89	7.37	7.10
1924	8.16	9.12	10.50	10.21	8.11	5.82	5.66	6.18	5.46	6.60	6.62	8.45	7.57
1925	10.33	9.69	9.22	7.84	7.96	6.25	7.48	6.83	6.95	7.64	8.16	9.57	8.16
1926	9.72	9.18	8.82	8.87	7.97	5.85	5.97	6.50	6.25	6.12	5.88	5.86	7.25
1927	6.94	8.03	8.88	9.62	7.44	5.88	6.25	6.47	6.14	6.00	6.40	6.41	7.04
1928	7.03	8.96	9.47	10.16	8.53	6.12	6.28	6.72	6.34	6.18	5.84	7.03	7.39
1929	9.32	8.78	9.72	10.34	6.78	6.28	5.85	5.34	4.56	4.70	5.38	5.41	6.87
1930	6.50	5.53	5.59	5.66	5.31	3.38	3.12	3.53	3.50	3.10	3.34	3.22	4.32
1931	3.97	4.25	4.54	3.90	2.78	1.62	2.50	2.03	1.58	1.94	2.16	2.18	2.79
	LAMBS												
1901	5.30	5.10	5.25	5.10	4.85	4.60	5.10	4.80	4.35	4.30	4.10	4.75	4.80
1902	5.55	6.05	6.15	6.30	6.20	5.80	5.55	5.35	4.85	4.70	4.55	4.80	5.49
1903	5.50	6.10	6.60	6.20	6.20	5.50	5.30	4.90	4.85	4.80	4.70	4.85	5.46
1904	5.55	5.40	5.30	5.60	5.70	5.60	6.15	5.45	5.15	5.15	5.50	6.25	5.57
1905	7.15	7.40	7.05	6.80	6.25	5.90	6.30	7.05	7.00	7.05	6.90	7.25	6.84
1906	7.25	6.75	6.40	6.20	6.65	6.75	6.90	7.00	7.15	6.95	6.90	7.10	6.83
1907	7.30	7.30	7.55	8.05	7.80	7.20	7.05	6.90	6.90	6.80	6.05	5.70	7.05
1908	6.80	6.70	7.20	7.25	6.65	5.75	6.20	6.05	5.35	5.50	5.85	6.70	6.33
1909	7.35	7.50	7.65	7.85	8.25	7.60	7.70	7.35	6.80	6.50	7.10	7.50	7.43
1910	8.30	8.65	9.40	9.10	8.40	7.60	7.10	6.70	6.80	6.65	6.25	6.10	7.59
1911	6.20	6.05	6.10	5.50	5.85	6.10	6.30	6.35	5.70	5.75	5.45	5.75	5.92
1912	6.50	6.15	7.30	7.95	8.30	6.90	7.25	7.10	7.00	6.75	7.15	7.75	7.18
1913	8.55	8.50	8.60	8.40	7.40	6.85	7.55	7.40	7.15	7.05	7.25	7.60	7.69
1914	7.90	7.60	7.65	7.60	8.10	7.95	8.45	8.15	7.80	7.60	8.75	8.30	7.99
1915	8.40	8.75	9.55	9.65	10.10	9.20	8.75	8.90	8.75	8.75	8.80	9.00	9.05
1916	10.30	10.90	11.10	10.45	10.75	9.55	10.55	10.75	10.60	10.15	11.40	12.70	10.77
1917	13.85	14.30	14.25	14.40	16.90	15.25	15.65	15.50	17.50	17.40	16.75	16.45	15.68
1918	17.20	16.60	17.55	19.20	18.00	16.85	18.50	17.50	17.25	15.35	15.10	14.60	16.98
1919	16.25	17.40	19.05	18.15	16.25	14.05	17.10	16.75	14.85	15.00	14.50	16.40	16.31
1920	19.50	19.95	18.80	18.80	17.40	14.25	15.55	13.20	13.30	12.35	11.70	11.20	15.50
1921	10.72	9.07	9.91	9.69	11.07	10.67	10.09	9.46	8.86	8.66	9.25	10.86	9.86
1922	12.67	14.49	15.39	14.10	12.95	12.42	13.04	12.51	13.53	13.94	14.17	14.93	13.68
1923	14.69	14.85	14.56	14.42	14.12	14.81	14.22	12.89	13.52	12.93	12.75	12.96	13.89
1924	13.53	14.95	16.06	16.22	15.23	14.12	13.79	13.57	13.38	13.52	14.03	16.47	14.57
1925	18.28	17.59	16.28	14.85	13.06	15.86	15.11	14.88	15.19	15.20	15.44	16.15	15.66
1926	15.28	13.78	13.48	14.38	15.30	16.66	14.31	14.20	14.05	13.88	13.25	12.57	14.26
1927	12.64	13.28	15.27	15.87	14.75	15.66	14.25	13.68	13.46	13.70	13.80	13.14	14.12
1928	13.16	15.39	16.26	16.81	16.10	16.84	15.61	14.72	14.29	13.12	13.31	14.31	14.99
1929	16.37	16.53	17.07	16.82	13.62	15.34	14.38	13.50	13.19	12.72	12.72	13.22	14.62
1930	13.28	11.03	10.28	9.38	9.73	12.28	10.18	9.39	8.24	7.72	7.34	7.44	9.69
1931	8.43	8.19	8.31	9.06	8.55	7.72	6.62	6.88	6.49	5.88	5.64	5.32	7.26

Bureau of Agricultural Economics. Figures prior to 1921 are from the Chicago Drovers Journal Yearbook, average native and western sheep and average aged lambs. Subsequent figures are bulk of sales prices from data of the livestock and meat reporting service of the bureau.

[1] Simple average of monthly prices.

TABLE 357.—*Sheep and lambs: Average price per 100 pounds at Chicago and Omaha, by months, July, 1930–December, 1931*

CHICAGO

Year and month	Lambs		Yearling wethers 90–110 pounds Medium to Choice	Ewes		Feeding lambs, 50–75 pounds	
	90 pounds down, Good and Choice	All weights, Common		90–120 pounds, Medium to Choice	All weights, Cull and Common	Good and Choice	Medium
1930	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
July	10.13	6.89	7.43	3.28	1.85	7.22	6.52
August	9.40	6.20	6.44	3.47	2.01	6.89	6.12
September	8.49	5.64	6.14	3.60	2.22	7.12	6.16
October	8.06	5.60	5.60	3.20	1.79	7.00	6.08
November	7.95	5.46	5.93	3.38	1.88	7.06	6.09
December	7.97	5.50	5.70	3.12	1.76	7.12	6.12
Average, 6 months	8.67	5.88	6.21	3.34	1.92	7.07	6.18
1931							
January	8.71	6.48	6.65	3.92	2.61	7.52	6.65
February	8.59	6.52	6.55	4.32	2.89	7.98	7.12
March	8.89	6.91	6.92	4.50	3.00	7.99	7.10
April	9.35	7.56	6.94	4.12	2.69		
May [1]	8.84	6.69	6.05	2.96	1.80		
June [2]	8.70	5.78	5.53	2.04	1.09		
July	7.67	4.78	4.94	2.64	1.48	5.30	4.46
August	7.58	4.41	4.92	2.57	1.44	5.41	4.73
September	6.84	4.27	4.70	2.01	1.11	5.41	4.58
October	6.36	4.23	4.43	2.21	1.27	5.16	4.43
November	6.02	4.05	4.15	2.33	1.46	4.76	4.25
December	5.68	3.86	3.85	2.40	1.54	4.72	4.12
Average	7.77	5.46	5.47	3.00	1.86		

OMAHA

Year and month	Lambs, 90 pounds down, Good and Choice	Lambs, All weights, Common	Yearling wethers 90–110 pounds Medium to Choice	Ewes, 90–120 pounds, Medium to Choice	Ewes, All weights, Cull and Common	Feeding lambs, Good and Choice	Feeding lambs, Medium
1930							
July	9.54	6.58	6.12	2.72	1.50	6.80	5.91
August	8.93	5.86	5.47	3.24	1.75	6.61	5.66
September	7.78	5.40	5.62	2.98	1.64	6.73	5.76
October	7.56	5.29	5.03	2.51	1.40	6.50	5.56
November	7.50	5.48	5.44	3.17	1.74	6.74	5.69
December	7.63	5.22	5.40	3.22	1.86	6.92	5.90
Average, 6 months	8.16	5.64	5.51	2.97	1.65	6.72	5.75
1931							
January	8.22	6.10	5.72	3.56	2.00	7.60	6.28
February	8.21	6.35	5.97	4.13	2.46	7.58	6.45
March	8.42	6.61	6.26	4.38	2.69	7.81	6.69
April	8.97	7.50	6.58	3.79	2.31	7.98	6.75
May [1]	8.62	6.83	5.98	2.74	1.74	7.52	6.42
June [2]	8.22	5.54	4.80	1.48	.87	5.45	4.61
July	7.02	4.49	4.24	2.02	1.17	5.23	4.41
August	7.12	4.56	4.50	2.15	1.14	5.11	4.31
September	6.33	4.25	4.07	1.84	.98	5.08	4.22
October	5.78	3.90	4.06	1.96	1.04	4.53	3.55
November	5.58	3.69	3.88	2.00	1.00	4.28	3.33
December	5.23	3.57	3.60	1.95	1.00	3.96	3.15
Average	7.31	5.28	4.97	2.67	1.53	6.01	5.01

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-reporting service of the bureau. Earlier data in 1927 Yearbook, pp. 1032-1034 and in 1931 Yearbook, p. 870.

[1] Beginning May 18, quotations were on shorn basis.

[2] Effective June 1, new crop lambs were classified as lambs and lambs of or closely approaching the yearling age were classified as yearlings.

TABLE 358.—*Sheep and lambs: Slaughter*[1] *under Federal inspection by months, 1922–1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
1922	954	776	837	739	872	1,028	964	1,024	1,013	981	882	858	10,929
1923	1,021	836	977	960	972	914	962	957	990	1,046	915	978	11,529
1924	1,083	912	868	860	959	975	1,051	1,063	1,150	1,148	950	972	11,991
1925	990	854	984	1,012	1,030	999	1,071	1,031	1,086	1,083	879	981	12,001
1926	1,039	988	1,163	994	959	1,081	1,042	1,093	1,224	1,167	1,039	1,172	12,961
1927	1,115	1,006	1,027	960	992	1,058	1,014	1,168	1,185	1,194	1,071	1,094	12,883
1928	1,151	1,048	1,016	918	1,016	1,109	1,076	1,196	1,307	1,409	1,189	1,053	13,488
1929	1,150	953	1,006	1,119	1,202	1,108	1,255	1,298	1,317	1,365	1,159	1,091	14,023
1930	1,225	1,187	1,358	1,387	1,370	1,295	1,411	1,413	1,591	1,727	1,306	1,427	16,696
1931	1,426	1,223	1,324	1,493	1,444	1,516	1,491	1,598	1,667	1,804	1,505	1,581	18,071

Bureau of Animal Industry.

[1] The figures include condemned carcasses.

TABLE 359.—*Mutton and lamb: International trade, average 1925–1929, annual 1927–1930*

Country	Calendar year									
	Average 1925–1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
New Zealand	301,079	0	311,135	0	317,539	0	305,951	0	381,914	0
Argentina	176,547	0	183,260	0	171,108	0	177,576	0	177,693	0
Australia [2]	72,153	17	93,520	6	46,363	4	84,929	24	100,411	0
Uruguay	41,048	0	52,102	0	31,010	0	49,112	0	[3]62,259	0
Netherlands	14,942	1,049	16,084	1,254	14,380	759	12,859	692	11,342	550
Irish Free State	1,370	344	1,478	275	2,359	312	2,771	246	2,115	244
Union of South Africa	171	20	133	52	201	47	160	0	299	0
Total	607,310	1,430	657,712	1,587	582,960	1,122	633,358	962	736,033	794
PRINCIPAL EXPORTING COUNTRIES										
United Kingdom	0	629,309	0	627,303	0	640,414	0	642,712	0	730,270
France	213	22,035	274	29,822	305	15,173	141	21,060	143	30,053
Germany	637	7,868	622	10,083	79	9,909	3	9,129	2,457	9,679
United States	1,087	7,255	937	9,544	1,024	9,202	835	11,395	1,251	8,181
Norway	0	4,581	0	4,902	0	4,358	0	4,714	0	4,904
Belgium	702	3,763	839	3,914	445	3,970	1,125	4,896	1,724	4,397
Canada	1,501	2,335	1,889	1,946	1,128	2,333	573	4,401	241	4,412
Denmark	9	2,152	5	2,232	1	2,397	0	2,588	[3]5	2,594
Sweden	36	1,058	30	1,371	45	1,089	38	953	25	1,515
Total	4,185	680,356	4,596	691,117	3,027	688,845	2,715	701,848	5,846	796,005

Bureau of Agricultural Economics. Official sources except as otherwise noted.

[1] Preliminary. [2] Year ended June 30. [3] International Yearbook of Agricultural Statistics.

TABLE 360.—*Mutton and lamb, frozen: Cold-storage holdings, United States 1922–1931*

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
1922	6,444	3,914	2,863	2,878	2,071	2,310	3,720	3,308	3,376	3,473	3,458	3,633
1923	4,523	5,980	5,758	6,635	5,774	4,445	3,556	2,752	1,785	1,719	1,997	2,014
1924	2,493	2,306	2,173	1,719	2,093	2,273	2,917	2,257	2,230	2,525	3,166	3,326
1925	2,949	2,336	2,294	2,090	1,998	1,913	1,535	1,349	1,339	1,112	1,435	1,549
1926	1,820	2,354	3,346	3,289	2,393	1,697	1,871	1,813	1,929	2,234	2,814	3,166
1927	4,556	4,447	4,074	2,940	1,862	1,210	1,360	1,161	1,302	1,991	2,958	3,790
1928	4,408	4,404	4,020	3,252	1,828	1,276	1,947	1,822	1,691	2,113	4,321	5,472
1929	5,623	4,009	3,252	3,109	2,533	2,461	3,061	2,639	3,159	4,113	4,992	5,194
1930	5,317	4,667	5,408	5,174	5,190	4,639	4,820	4,476	3,977	4,320	4,326	4,628
1931	4,677	4,081	3,573	3,063	2,529	2,371	2,685	1,892	1,975	1,908	1,975	1,985

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

TABLE 361.—*Sheep and lambs: Shipments, slaughter, value of production, and income, by States, 1930*

State and division	Shipments and local slaughter				Inshipments, stocker, feeding, and breeding			
	Sheep		Lambs		Sheep		Lambs	
	Head	Total weight	Head	Total weight	Head	Total weight	Head	Total weight
	Thousands	*1,000 pounds*	*Thousands*	*1,000 pounds*	*Thousands*	*1,000 pounds*	*Thousands*	*1,000 pounds*
Maine	11	1,100	21	1,260	1	100		
New Hampshire	3	300	4	240				
Vermont	3	300	14	840				
Massachusetts	3	300	4	260	1	100		
Rhode Island			1	65				
Connecticut			3	195				
New York	53	6,201	205	14,410	4	400	27	1,620
New Jersey			2	150				
Pennsylvania	49	5,145	159	11,130			2	120
North Atlantic	122	13,346	413	28,550	6	600	29	1,740
Ohio	170	19,550	903	63,210	4	400	32	2,080
Indiana	57	6,840	551	46,835	26	2,600	150	9,750
Illinois	73	8,760	533	45,305	9	900	186	13,020
Michigan	127	15,240	816	69,360	9	900	90	6,120
Wisconsin	49	5,390	390	31,200	18	1,980	166	11,620
North Central, East	476	55,780	3,193	255,910	66	6,780	624	42,590
Minnesota	94	10,396	520	43,144	56	5,600	163	9,780
Iowa	121	14,520	1,025	82,000	48	4,800	500	32,500
Missouri	104	11,440	866	64,950	25	2,625	245	15,925
North Dakota	53	5,830	385	28,875	10	1,000	97	6,305
South Dakota	62	6,820	530	39,750	10	1,100	143	10,725
Nebraska	69	7,590	1,504	135,340	46	4,600	1,106	71,890
Kansas	71	7,810	583	52,455	28	2,800	460	29,900
North Central, West	574	64,406	5,413	446,514	223	22,525	2,714	177,025
North Central	1,050	120,186	8,606	702,424	289	29,305	3,338	219,615
Delaware			1	65				
Maryland	9	990	79	6,320	1	110	2	130
Virginia	29	3,480	327	26,160	1	90		
West Virginia	45	4,950	332	26,560				
North Carolina	9	765	34	1,870				
South Carolina	1	90	3	135				
Georgia	1	85	8	400				
Florida	6	510	5	250				
South Atlantic	100	10,870	789	61,760	2	200	2	130
Kentucky	105	11,670	838	62,850	11	1,100		
Tennessee	31	3,410	224	16,800	2	220	2	140
Alabama	6	480	12	600				
Mississippi	5	400	3	150	1	80		
Arkansas	4	420	12	720				
Louisiana	4	372	5	250	1	90		
Oklahoma	24	2,520	91	5,915	15	1,500	50	2,500
Texas	285	27,075	519	31,790	12	1,200	7	420
South Central	464	46,347	1,704	119,075	42	4,190	59	3,060
Montana	231	25,410	1,780	133,500	10	1,000	2	150
Idaho	190	21,850	1,622	129,760	150	15,000	380	24,700
Wyoming	133	14,098	1,366	96,986	12	1,200	30	2,040
Colorado	155	16,275	2,615	209,200	70	7,000	1,469	92,547
New Mexico	51	5,100	606	39,390	25	2,500	3	210
Arizona	96	10,272	223	16,725				X
Utah	215	23,005	1,120	78,400	20	2,000	56	3,920
Nevada	80	8,375	362	23,530	2	210	18	1,170
Washington	31	3,410	382	30,560	4	400	24	1,680
Oregon	136	14,552	1,111	84,436	4	440		
California	325	32,500	1,850	139,550	100	9,000	131	7,860
Western	1,643	174,847	13,037	982,037	397	38,750	2,113	134,277
United States	3,379	365,596	24,549	1,893,846	736	73,045	5,541	358,822

See footnote at end of table.

TABLE 361.—*Sheep and lambs: Shipments, slaughter, value of production, and income, by States, 1930*—Continued

State and division	Farm slaughter: Sheep, Head	Farm slaughter: Sheep, Total weight	Farm slaughter: Lambs, Head	Farm slaughter: Lambs, Total weight	Value of amount consumed on farms	Receipts from sales	Gross income	Value of production
	Thousands	*1,000 pounds*	*Thousands*	*1,000 pounds*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
Maine	2	200	5	300	10	201	211	204
New Hampshire	2	200	2	120	5	56	61	46
Vermont	1	100	2	120	4	107	111	111
Massachusetts	---	---	1	65	1	41	42	42
Rhode Island	---	---	---	---	---	7	7	7
Connecticut	---	---	1	65	1	28	29	33
New York	15	1,755	35	2,485	30	1,776	1,806	1,570
New Jersey	---	---	1	75	2	21	23	22
Pennsylvania	8	880	12	840	15	1,275	1,290	1,318
North Atlantic	28	3,135	59	4,070	68	3,512	3,580	3,353
Ohio	8	960	12	960	79	5,811	5,890	5,383
Indiana	1	125	2	160	14	3,488	3,502	3,593
Illinois	4	480	5	425	51	3,375	3,426	3,199
Michigan	7	840	8	600	31	6,039	6,070	5,441
Wisconsin	5	625	8	720	61	1,807	1,868	2,063
North Central, East	25	3,030	35	2,865	236	20,520	20,756	19,679
Minnesota	6	744	12	972	90	3,230	3,320	3,933
Iowa	12	1,500	13	1,066	147	4,721	4,868	4,521
Missouri	5	600	10	750	71	4,912	4,983	4,517
North Dakota	6	720	9	720	67	1,642	1,709	2,139
South Dakota	4	440	10	750	76	2,610	2,686	3,118
Nebraska	2	220	1	75	19	7,643	7,662	4,319
Kansas	2	240	3	228	25	2,901	2,926	2,872
North Central, West	37	4,464	58	4,561	495	27,659	28,154	25,419
North Central	62	7,494	93	7,426	731	48,179	48,910	45,098
Delaware	---	---	---	---	---	4	4	4
Maryland	1	110	2	160	10	705	715	693
Virginia	4	480	9	720	50	2,575	2,625	2,598
West Virginia	6	660	10	800	57	2,613	2,670	2,792
North Carolina	2	180	3	165	14	239	253	269
South Carolina	1	90	1	45	3	24	27	19
Georgia	2	170	2	100	9	49	58	65
Florida	---	---	---	---	---	48	48	48
South Atlantic	16	1,690	27	1,990	143	6,257	6,400	6,488
Kentucky	7	840	9	675	67	6,352	6,419	6,069
Tennessee	3	330	5	375	32	1,729	1,761	1,865
Alabama	2	160	2	100	7	89	96	76
Mississippi	1	80	2	100	6	38	44	41
Arkansas	1	105	3	180	7	72	79	85
Louisiana	2	186	4	200	13	47	60	69
Oklahoma	2	220	2	130	16	363	379	421
Texas	5	450	11	770	68	3,612	3,680	6,814
South Central	23	2,371	38	2,530	216	12,302	12,518	15,440
Montana	15	1,800	20	1,500	127	9,816	9,943	10,630
Idaho	8	920	10	800	80	7,538	7,618	8,309
Wyoming	5	550	10	710	63	6,821	6,884	8,643
Colorado	17	1,785	22	1,760	213	11,526	11,739	7,903
New Mexico	60	6,000	24	1,680	353	2,275	2,628	3,794
Arizona	55	5,885	20	1,500	384	1,929	2,313	2,814
Utah	25	2,675	23	1,725	210	6,191	6,401	7,005
Nevada	8	800	7	476	59	1,826	1,885	2,261
Washington	5	600	15	1,200	42	2,148	2,190	2,308
Oregon	17	1,870	18	1,368	119	6,273	6,392	7,229
California	20	2,000	40	3,080	254	12,518	12,772	13,067
Western	235	24,885	209	15,799	1,904	68,861	70,765	73,963
United States	364	39,575	426	31,815	3,062	139,111	142,173	144,342

Bureau of Agricultural Economics. Estimates of Division of Crop and Livestock Estimates. Subject to revision. For 5-year average 1924–1928 see 1931 Yearbook Table 414. The figures on income and value of production as shown in Table 455 are computed from the data shown in this table. The difference between value of production and income arises from the fact that in computing value of production allowance is made for changes in inventory numbers between the beginning and end of the year, while in computing income these changes are not used.

TABLE 362.—*Wool, shorn: Estimated production by States, 1925–1931*

State and division	Production							Number of fleeces [1]	
	1925	1926	1927	1928	1929	1930	1931	1925	1926
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*Thousands*	*Thousands*
Maine	526	559	546	529	470	471	491	81	86
New Hampshire	102	110	117	122	109	113	107	16	17
Vermont	252	277	292	268	264	255	252	35	38
Massachusetts	68	62	63	62	59	66	59	11	10
Rhode Island	12	12	12	12	12	12	12	2	2
Connecticut	41	43	41	46	40	46	51	7	7
New York	2, 898	3, 081	3, 212	3, 096	3, 096	3, 110	3, 008	397	422
New Jersey	31	32	32	30	37	37	43	5	5
Pennsylvania	2, 805	2, 730	2, 730	2, 898	2, 982	3, 108	3, 248	374	374
North Atlantic	6, 735	6, 906	7, 045	7, 063	7, 069	7, 218	7, 271	928	961
Ohio	14, 467	14, 760	15, 662	14, 776	14, 661	15, 066	15, 453	1, 786	1, 800
Indiana	3, 562	3, 715	3, 922	4, 402	4, 500	4, 752	4, 980	488	502
Illinois	3, 352	3, 794	4, 186	4, 166	4, 514	4, 815	4, 797	465	530
Michigan	7, 416	7, 600	8, 446	8, 774	8, 480	8, 400	8, 526	927	950
Wisconsin	2, 250	2, 475	2, 774	2, 888	2, 888	3, 225	3, 102	300	330
North Central, East	31, 047	32, 344	34, 990	35, 006	35, 043	36, 258	36, 858	3, 966	4, 112
Minnesota	3, 151	3, 634	4, 211	4, 700	5, 372	6, 115	6, 435	404	460
Iowa	5, 440	5, 520	5, 880	6, 320	6, 800	7, 640	7, 920	680	690
Missouri	5, 537	5, 500	5, 505	5, 686	6, 699	6, 865	7, 304	850	855
North Dakota	2, 263	2, 772	3, 654	4, 250	5, 287	6, 264	7, 012	276	334
South Dakota	4, 446	4, 772	5, 418	6, 149	7, 003	7, 794	8, 820	570	582
Nebraska	2, 114	2, 334	2, 400	2, 544	2, 685	3, 000	2, 786	290	315
Kansas	2, 028	2, 183	2, 393	2, 710	3, 172	3, 365	3, 243	300	330
North Central, West	24, 979	26, 715	29, 461	32, 359	37, 018	41, 043	43, 520	3, 370	3, 566
North Central	56, 026	59, 059	64, 451	67, 365	72, 061	77, 301	80, 378	7, 336	7, 678
Delaware	12	12	12	18	19	19	24	2	2
Maryland	439	472	510	531	561	580	552	72	75
Virginia	1, 485	1, 695	1, 810	1, 965	2, 105	2, 200	2, 225	316	326
West Virginia	2, 272	2, 205	2, 263	2, 646	2, 798	2, 844	3, 021	437	416
North Carolina	270	304	350	357	408	376	394	60	66
South Carolina	48	45	50	55	52	52	52	12	11
Georgia	131	139	126	122	116	112	112	41	41
Florida	147	144	138	126	124	114	111	49	48
South Atlantic	4, 804	5, 016	3, 259	5, 820	6, 183	6, 297	6, 491	989	985
Kentucky	3, 125	3, 278	3, 658	3, 807	3, 901	4, 175	4, 080	651	683
Tennessee	1, 144	1, 118	1, 174	1, 287	1, 344	1, 423	1, 531	266	260
Alabama	155	172	173	175	184	160	143	47	49
Mississippi	304	288	256	256	274	274	274	95	90
Arkansas	202	202	212	202	190	181	198	43	43
Louisiana	294	288	330	368	418	425	443	89	90
Oklahoma	372	410	531	690	886	1, 034	1, 170	51	54
Texas	27, 056	28, 900	34, 725	40, 120	46, 779	48, 262	53, 360	3, 767	3, 963
South Central	32, 652	34, 656	41, 059	46, 905	53, 976	55, 934	61, 199	5, 009	5, 232
Montana	20, 158	23, 051	24, 693	26, 970	31, 122	34, 034	35, 948	2, 344	2, 590
Idaho	15, 438	15, 798	15, 555	17, 425	18, 156	18, 156	19, 419	1, 860	1, 775
Wyoming	22, 500	22, 338	26, 460	27, 900	26, 502	29, 702	34, 560	2, 560	2, 628
Colorado	6, 956	8, 132	8, 877	11, 300	12, 269	13, 446	13, 541	940	1, 070
New Mexico	12, 033	13, 084	14, 023	14, 824	15, 230	16, 870	16, 632	1, 910	2, 013
Arizona	6, 252	6, 283	6, 200	5, 978	5, 820	5, 640	5, 760	1, 025	1, 030
Utah	18, 438	20, 093	20, 915	23, 064	20, 655	24, 440	23, 056	2, 144	2, 208
Nevada	7, 560	8, 508	8, 015	8, 923	7, 777	7, 944	8, 720	1, 050	1, 105
Washington	4, 750	4, 998	5, 233	5, 635	5, 485	6, 175	6, 336	500	510
Oregon	16, 958	18, 321	18, 128	20, 332	19, 531	21, 375	22, 000	1, 927	1, 970
California	21, 572	22, 657	23, 996	25, 084	25, 730	26, 989	28, 004	2, 932	3, 133
Western	152, 615	163, 263	172, 095	187, 435	188, 277	204, 771	213, 976	19, 192	20, 032
United States	252, 832	268 900	289, 909	314, 588	327, 566	351, 521	369, 315	33, 454	34, 888

See footnotes at end of table.

TABLE 362.—*Wool, shorn: Estimated production, by States, 1925–1931*—Continued

State and division	Number of fleeces [1]					Weight per fleece [2]						
	1927	1928	1929	1930	1931	1925	1926	1927	1928	1929	1930	1931
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
Maine	84	84	77	76	78	6.5	6.5	6.5	6.3	6.1	6.2	6.3
New Hampshire	18	19	17	18	17	6.4	6.5	6.5	6.4	6.4	6.3	6.3
Vermont	40	40	39	38	37	7.2	7.3	7.3	6.7	6.7	6.7	6.8
Massachusetts	10	10	10	11	10	6.2	6.2	6.3	6.2	5.9	6.0	5.9
Rhode Island	2	2	2	2	2	6.2	6.2	6.2	6.1	5.9	6.2	5.9
Connecticut	7	8	7	8	9	5.9	6.1	5.9	5.7	5.7	5.8	5.7
New York	440	430	430	432	412	7.3	7.3	7.3	7.2	7.2	7.2	7.3
New Jersey	5	5	6	6	7	6.2	6.3	6.3	6.1	6.1	6.1	6.2
Pennsylvania	364	397	403	420	433	7.5	7.3	7.5	7.3	7.4	7.4	7.5
North Atlantic	970	995	991	1,011	1,005	7.3	7.2	7.3	7.1	7.1	7.1	7.2
Ohio	1,910	1,802	1,810	1,860	1,818	8.1	8.2	8.2	8.2	8.1	8.1	8.5
Indiana	530	603	625	660	673	7.3	7.4	7.4	7.3	7.2	7.2	7.4
Illinois	585	565	615	664	641	7.2	7.2	7.2	7.4	7.3	7.3	7.4
Michigan	1,030	1,070	1,060	1,050	1,015	8.0	8.0	8.2	8.2	8.0	8.0	8.4
Wisconsin	365	375	385	430	425	7.5	7.5	7.6	7.7	7.5	7.5	7.3
North Central, East	4,420	4,415	4,495	4,664	4,572	7.8	7.9	7.9	7.9	7.8	7.8	8.1
Minnesota	533	595	680	784	825	7.8	7.9	7.9	7.9	7.9	7.8	7.8
Iowa	735	790	850	955	990	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Missouri	860	840	1,010	1,070	1,090	6.5	6.4	6.4	6.8	6.6	6.4	6.7
North Dakota	420	500	622	737	825	8.2	8.3	8.7	8.5	8.5	8.5	8.5
South Dakota	645	732	854	939	1,050	7.8	8.2	8.4	8.4	8.2	8.3	8.4
Nebraska	320	340	365	400	380	7.3	7.4	7.5	7.7	7.4	7.5	7.3
Kansas	356	400	470	498	475	6.8	6.6	6.7	6.8	6.7	6.8	6.8
North Central, West	3,869	4,197	4,851	5,383	5,635	7.4	7.5	7.6	7.7	7.6	7.6	7.7
North Central	8,289	8,612	9,346	10,047	10,207	7.6	7.7	7.8	7.8	7.7	7.7	7.9
Delaware	2	3	3	3	4	6.0	6.0	6.0	6.1	6.3	6.2	6.0
Maryland	81	87	89	92	89	6.1	6.3	6.3	6.1	6.3	6.3	6.2
Virginia	348	393	421	440	445	4.7	5.2	5.2	5.0	5.0	5.0	5.0
West Virginia	427	490	528	547	570	5.2	5.3	5.3	5.4	5.3	5.2	5.3
North Carolina	73	76	85	80	82	4.5	4.6	4.8	4.7	4.8	4.7	4.8
South Carolina	12	13	12	12	12	4.0	4.1	4.2	4.2	4.3	4.3	4.3
Georgia	35	36	34	33	33	3.2	3.4	3.6	3.4	3.4	3.4	3.4
Florida	46	42	40	38	37	3.0	3.0	3.0	3.0	3.1	3.0	3.0
South Atlantic	1,024	1,140	1,212	1,245	1,272	4.9	5.1	5.1	5.1	5.1	5.1	5.1
Kentucky	762	810	830	835	800	4.8	4.8	4.8	4.7	4.7	5.0	5.1
Tennessee	273	314	320	331	348	4.3	4.3	4.3	4.1	4.2	4.3	4.4
Alabama	48	50	52	47	42	3.3	3.5	3.6	3.5	3.5	3.4	3.4
Mississippi	80	80	83	83	83	3.2	3.2	3.2	3.2	3.3	3.3	3.3
Arkansas	45	44	42	42	44	4.7	4.7	4.7	4.6	4.5	4.3	4.5
Louisiana	100	115	130	125	123	3.3	3.2	3.3	3.2	3.2	3.4	3.6
Oklahoma	69	92	123	136	150	7.3	7.6	7.7	7.5	7.2	7.6	7.8
Texas	4,526	4,938	5,680	6,232	6,836	7.2	7.3	7.7	8.1	8.2	7.7	7.8
South Central	5,903	6,443	7,260	7,831	8,426	6.5	6.6	7.0	7.3	7.4	7.1	7.3
Montana	2,806	3,100	3,458	3,740	3,784	8.6	8.9	8.8	8.7	9.0	9.1	9.5
Idaho	1,830	1,894	2,040	2,040	2,134	8.3	8.9	8.5	9.2	8.9	8.9	9.1
Wyoming	2,973	3,100	3,155	3,264	3,600	8.8	8.5	8.9	9.0	8.4	9.1	9.6
Colorado	1,216	1,395	1,573	1,660	1,736	7.4	7.6	7.3	8.1	7.8	8.1	7.8
New Mexico	2,093	2,180	2,145	2,343	2,520	6.3	6.5	6.7	6.8	7.1	7.2	6.6
Arizona	1,000	980	970	940	960	6.1	6.1	6.2	6.1	6.0	6.0	6.0
Utah	2,350	2,480	2,430	2,600	2,620	8.6	9.1	8.9	9.3	8.5	9.4	8.8
Nevada	1,098	1,144	1,010	993	1,090	7.2	7.7	7.3	7.8	7.7	8.0	8.0
Washington	534	575	615	650	660	9.5	9.8	9.8	9.8	8.9	9.5	9.6
Oregon	2,060	2,210	2,271	2,375	2,500	8.8	9.3	8.8	9.2	8.6	9.0	8.8
California	3,280	3,469	3,472	3,694	3,887	7.4	7.2	7.3	7.2	7.4	7.3	7.2
Western	21,240	22,527	23,139	24,299	25,491	8.0	8.2	8.1	8.3	8.1	8.4	8.4
United States	37,426	39,717	41,948	44,433	46,401	7.6	7.7	7.7	7.9	7.8	7.9	8.0

Bureau of Agricultural Economics. All years shown, revised January, 1932.

[1] In States where sheep are shorn twice a year, principally Texas and California, this figure covers wool per head of sheep shorn and not weight per fleece.

[2] Include fleeces taken at commercial feeding plants. California figures include some fleeces taken from early lambs.

TABLE 363.—*Wool: International trade, average 1925–1929, annual 1928–1930*

Country	Calendar year							
	Average 1925–1929		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Australia [2]	739,123	3,990	715,028	6,286	764,760	3,819	851,762	2,393
Argentina	284,973	302	276,463	355	284,313	336	297,643	116
Union of South Africa	254,431	576	261,211	943	296,917	701	281,898	245
New Zealand	220,228	103	226,805	89	234,956	73	197,240	13
Uruguay	117,856	0	117,771	0	112,620	0	172,657	0
China	58,272	568	73,623	421	59,864	444	30,743	210
British India	50,373	27,843	57,649	32,693	56,774	26,128	32,193	14,461
Chile	26,196	435	26,689	584	23,519	554	20,051	72
Algeria	24,047	3,632	26,526	3,815	14,481	3,646	18,592	2,043
Morocco	13,345	0	13,038	0	7,195	0	4,024	0
Irish Free State	12,706	1,282	12,284	865	13,116	1,043	[2] 6,600	788
Persia [3]	11,918	1,380	12,192	974	11,713	1,212	------	------
Hungary	11,715	1,643	9,187	1,925	11,317	1,460	8,718	1,648
Brazil	11,021	------	10,160	------	11,392	------	16,229	------
Peru	10,760	1	12,411	2	10,569	4	7,151	0
Spain	9,715	4,918	7,523	6,509	10,674	6,111	6,051	7,320
Egypt and Sudan	3,997	[4] −127	3,930	[4] −221	4,790	[4] −296	2,288	[4] −81
Tunis	2,982	1,383	4,216	1,423	2,503	1,666	1,039	1,280
Total	1,873,658	47,929	1,866,706	56,663	1,931,473	46,901	1,954,879	30,508
PRINCIPAL IMPORTING COUNTRIES								
France	53,286	633,028	59,924	612,072	64,820	686,613	52,609	688,589
United Kingdom	54,037	473,061	48,007	462,691	51,984	503,232	32,661	513,619
Germany	24,109	361,447	26,542	380,649	34,973	376,437	23,384	347,966
United States	322	288,346	485	244,553	239	280,371	162	163,734
Belgium	19,091	135,887	34,778	144,701	35,955	171,261	33,192	163,156
Italy	7,188	99,134	8,358	106,919	6,398	120,248	4,314	119,588
Japan	0	93,489	0	116,194	0	107,429	0	115,025
Russia	[2] 4,024	46,095	[2] 179	82,269	[2] 112	86,429	[2] 0	72,139
Czechoslovakia	3,381	35,889	3,195	37,922	3,164	43,454	1,813	39,530
Poland	1,398	30,255	1,545	30,487	908	35,003	334	32,403
Switzerland	45	17,404	35	17,202	47	17,827	50	19,790
Austria	973	16,490	832	16,456	499	19,506	390	16,472
Canada	7,307	13,930	8,351	14,271	6,090	12,086	4,382	9,459
Sweden	241	10,826	374	11,829	274	12,512	234	10,562
Netherlands	2,830	10,518	2,924	10,457	3,244	12,119	2,268	16,786
Yugoslavia	117	5,589	243	3,017	142	4,578	67	7,269
Rumania	1,287	[5] 4,011	[2] 1,636	------	[2] 2,393	[2] 5,305	[2] 262	[2] 3,860
Denmark	355	2,808	534	2,730	269	3,656	94	3,299
Finland	------	2,806	------	3,531	------	2,587	------	2,072
Bulgaria	3	2,699	11	2,715	0	3,760	[2] 35	2,712
Greece	641	2,063	523	1,477	616	2,615	624	2,803
Norway	601	1,812	1,113	1,717	641	1,542	214	1,771
Total	181,236	2,287,557	199,489	2,303,859	212,768	2,508,570	157,089	2,352,604

Bureau of Agricultural Economics. Official sources except where otherwise noted. "Wool" in this table includes washed, unwashed, scoured, pulled wool, slipe, also hair—camel's, mohair, angora goat, cashmere goat, and alpaca. The following items have been considered as not within this classification: Carded, combed, dyed wool, flocks; sheep, lamb and goat skins with hair on, mill waste, noils and tops.

[1] Preliminary.
[2] International Yearbook of Agricultural Statistics.
[3] Figures for Persia are for 12 months ended Mar. 21 of the year following year shown.
[4] Excess of reexports over imports.
[5] 4-year average.

TABLE 364.—*Wool: Estimated production in specified countries, average 1923–1925, annual 1925–1931*

Country	Average, 1923–1925 [1]	1925	1926	1927	1928	1929	1930	1931 [2]
SOUTHERN HEMISPHERE	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*
Australia	757.7	833.7	924.4	888.1	968.2	937.6	880.0	[3] 950.0
New Zealand [4]	205.8	200.2	202.4	229.0	239.0	242.0	266.0	[5] 257.0
Argentina [6]	310.0	319.0	363.0	344.0	352.0	320.0	351.0	[7] 333.0
Uruguay [6]	104.0	116.0	129.0	131.0	139.0	[3] 150.0	[3] 154.0	[8] 149.0
Union of South Africa [6] [9]	198.4	235.1	249.2	273.0	283.0	307.0	[10] 305.0	335.0
Total 5 Southern Hemisphere countries	1,575.9	1,704.0	1,868.0	1,865.1	1,981.2	1,956.6	1,956.0	2,024.0
NORTHERN HEMISPHERE								
United States:								
Shorn	240.0	252.8	268.9	289.9	314.6	327.6	351.5	369.3
Pulled	44.4	46.8	49.6	50.1	51.9	54.5	61.9	66.1
Total	284.4	299.6	318.5	340.0	366.5	382.1	413.4	435.4
Canada	15.4	15.6	18.0	18.7	19.6	20.3	21.0	--------
United Kingdom [11]	105.5	109.9	114.6	118.5	119.7	117.9	117.9	121.9
Norway	5.2	5.9	6.2	6.2	5.4	5.2	[5] 5.4	[5] 5.7
France	44.1	45.0	46.5	47.6	47.2	46.1	45.2	[5] 43.4
Spain [12]	71.6	71.8	78.0	79.8	(75.0)	[13] 73.0	73.5	73.8
Germany	50.7	50.2	41.8	35.9	[5] 33.6	[5] 31.9	[5] 30.6	[5] 30.8
Hungary	12.4	13.2	13.2	11.8	11.5	(10.0)	13.0	[5] 12.8
Rumania	52.8	54.9	53.1	55.7	53.1	52.5	50.2	49.5
Lithuania	4.6	4.6	5.0	3.8	4.1	3.6	3.2	3.6
Latvia	3.5	3.5	3.1	3.5	3.3	2.9	2.6	2.8
Algeria	33.9	45.7	39.3	36.8	36.8	47.2	49.6	38.0
Tunis	5.4	4.7	5.7	2.8	3.2	3.8	[5] 4.3	[5] 5.2
Total, 12 Northern Hemisphere countries reporting all periods	674.1	709.0	725.0	742.4	759.4	776.2	808.9	822.9
Total, 17 Northern and Southern Hemisphere countries reporting all years	2,250.0	2,413.0	2,593.0	2,607.5	2,740.6	2,732.8	2,764.9	2,846.9
Estimated world total excluding Russia and China [14]	2,717.0	2,892.0	34066.0	3,068.0	3,217.0	3,209.0	3,260.0	--------
Russia	[15] 315.0	315.0	351.0	369.0	391.8	394.2	310.8	--------
China [16]	56.2	56.8	27.8	48.0	64.8	50.2	26.1	--------

Bureau of Agricultural Economics. Includes wool shorn in the spring in the Northern Hemisphere and that shorn in the last few months of the same calendar year in the Southern Hemisphere. Includes small quantities of pulled wool in certain countries. For table showing all countries up to 1931, see Foreign Crops and Markets annual wool issue published in March or April, 1932, and for current information see World Wool Prospects, issued monthly by the Bureau of Agricultural Economics.

1 Average for years indicated whenever available, otherwise for any year or years within or near that period.
2 Preliminary.
3 Estimate furnished by cable from the International Institute of Agriculture.
4 Estimates of Dalgety & Co.
5 Estimate based on number of sheep at date nearest shearing.
6 Estimates based on exports, carryover, and domestic consumption.
7 Estimates of Buenos Aires branch of First National Bank of Boston.
8 Preliminary estimate furnished by Assistant Agricultural Commissioner, C. L. Luedtke.
9 Includes some wool imported from adjoining colonies and exported through Union ports.
10 Estimate furnished by Agricultural Commissioner, C. C. Taylor, Pretoria, South Africa. Official exports for season ending June 30, 1931, reached only 283,000,000 pounds but the carryover at end of season was fairly heavy.
11 Estimates of the Yorkshire Observer. These figures have been used instead of official estimates, as comparable figures are available up to 1931.
12 Revisions based on census for 1929.
13 Census.
14 Totals subject to revision. Few countries published official wool production estimates. In the absence of official figures for most countries, various estimates have been used. Some have been supplied by Government representatives abroad; others by multiplying official sheep numbers by an average weight per fleece. For some principal exporting countries, exports alone, or exports, stocks, and domestic consumption have been used as representing production. In the case of some Asiatic countries, rough commercial estimates have been used, while the figures of the United States Department of Commerce or the National Association of Wool Manufacturers have been used for some other countries.
15 Year 1925.
16 Exports.

Table 365.—*Wool: Production, imports, exports, and amount available for consumption, United States, 1910–1931*

Calendar year	Production			Imports [1]	Reexports [1]	Exports of domestic wool	Net imports [2]	Available for consumption [3]
	Shorn	Pulled	Total					
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
1910	281,363	40,000	321,363	180,135	9,055	[4] 48	171,032	492,395
1911	277,548	41,000	318,548	155,923	3,511	(5)	152,412	470,960
1912	262,543	41,500	304,043	238,118	1,816	(6)	236,302	540,345
1913	252,675	43,500	296,175	151,581	3,860	[4] 77	147,644	443,819
1914	247,192	43,000	290,192	256,501	6,342	[4] 335	249,823	540,015
1915	245,726	40,000	285,726	402,611	2,081	[4] 8,158	392,372	678,098
1916	244,890	43,600	288,490	442,650	2,128	3,919	436,603	725,093
1917	241,892	40,000	281,892	416,137	1,272	1,827	413,038	694,930
1918	256,870	42,000	298,870	447,426	452	407	446,567	745,437
1919	249,958	48,300	298,258	438,782	5,134	2,840	430,807	729,065
1920	250,617	42,900	293,517	254,905	12,393	8,845	233,666	527,183
1921	241,465	48,500	289,965	316,605	1,552	1,927	313,126	603,091
1922	228,109	42,000	270,109	366,538	4,225	453	361,861	631,970
1923	229,895	42,500	272,395	388,345	23,557	535	364,253	636,648
1924	237,131	43,800	280,931	262,655	27,476	309	234,869	515,800
1925	252,832	46,800	299,632	336,646	7,087	273	329,286	628,918
1926	268,900	49,600	318,500	299,451	14,082	292	285,077	603,577
1927	289,909	50,100	340,009	264,507	10,710	323	253,474	593,483
1928	314,588	51,900	366,488	240,360	4,435	485	235,440	601,928
1929	327,566	54,500	382,066	277,214	2,380	239	274,595	656,661
1930	351,521	61,900	413,421	162,482	1,715	162	160,605	574,026
1931 [7]	369,315	66,100	435,415	157,800	1,089	274	156,437	591,852

Bureau of Agricultural Economics. Production figures 1910–1913 from the National Association of Wool Manufacturers; 1914–1931 from the bureau; revisions of shorn wool by States, 1920–1924, may be found in Crops and Markets, March, 1932; 1925–1931 in Table 363 of 1932 Yearbook; imports and exports from the Bureau of Foreign and Domestic Commerce.

[1] Hair of Angora goat, alpaca, and other like animals included in imports and reexports prior to 1914 and in exports for all years.
[2] Total imports minus domestic exports and reexports.
[3] In computing these figures, stocks not taken into consideration.
[4] Exports for fiscal years ended June 30 of the years shown.
[5] Included in all other articles.
[6] No transactions.
[7] Preliminary.

Table 366.—*Wool, grades 56's, 64's–67's: Average price per pound at London, scoured basis, 1922–1931*

GRADE 56's

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922	45.90	46.00	47.00	50.35	53.70	48.20	50.20	51.00	55.40	66.60	68.30	69.60	54.35
1923	73.00	71.90	73.45	80.00	80.90	77.00	76.60	77.10	77.60	77.60	76.20	80.00	76.78
1924	80.90	84.20	85.00	83.75	82.50	82.00	81.50	87.15	92.80	101.00	105.00	111.30	89.76
1925	105.00	90.80	89.00	80.90	72.80	73.85	74.90	70.75	66.60	66.60	66.60	66.60	77.03
1926	60.80	60.80	60.80	59.80	58.30	56.80	58.80	59.80	60.80	59.80	57.00	58.80	59.36
1927	58.80	68.00	71.00	66.00	66.90	67.40	67.90	68.40	68.90	70.95	73.00	75.00	68.52
1928	77.00	80.00	81.10	79.55	78.00	77.50	77.00	74.00	71.00	70.00	73.00	74.00	76.01
1629	75.00	69.95	63.90	61.80	58.80	56.75	54.70	52.70	50.69	46.64	50.69	50.69	57.69
1930	40.55	40.55	34.47	35.48	37.51	37.00	36.00	34.50	32.44	30.42	26.36	26.36	34.30
1931	21.29	24.33	29.91	28.39	26.36	25.35	24.84	23.32	21.29	20.26	24.02	21.09	24.20

GRADES 64's–67's

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
1922	82.00	84.30	84.60	90.00	95.40	94.55	96.00	102.00	101.60	107.30	108.95	106.30	96.08
1923	112.40	107.00	107.70	106.40	115.50	110.70	111.00	111.30	111.60	112.50	112.60	113.70	111.03
1924	117.90	121.80	121.60	122.00	123.15	122.68	122.20	130.75	139.30	138.00	148.40	150.30	129.84
1925	140.10	130.00	119.70	115.95	112.20	112.60	113.00	110.00	107.00	108.90	111.00	101.00	115.12
1926	97.30	97.30	97.30	98.10	97.70	97.30	94.30	94.80	95.30	93.30	92.75	90.75	95.51
1927	89.20	94.00	95.30	94.30	95.30	95.80	96.30	96.85	97.40	98.40	99.40	99.40	95.97
1928	101.40	102.00	103.40	102.40	101.40	101.40	101.40	98.35	95.30	90.00	93.30	91.20	98.46
1929	91.20	90.00	85.20	83.00	79.00	76.25	73.50	70.00	66.91	64.88	63.87	62,86	75.55
1930	54.75	54.75	50.69	52.72	55.76	54.70	52.70	51.70	50.69	50.69	44.61	41.57	51.28
1931	34.47	38.53	44.61	42.58	42.58	40.55	39.54	37.51	34.47	30.79	31.78	26.00	36.95

Bureau of Agriculture Economics. These data were obtained from prices given by Kreglinger and Fernau for the opening and closing of each series of the London wool sales. For months when no sales were held the figures are interpolations of nearest actual prices. Conversions at monthly average rate of exchange as given in Federal Reserve Bulletins to December, 1925, and October to December 1931; others at par.

TABLE 367.—*Wool, shorn: Estimated average price per pound received by producers United States, 1922–1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922	18. 0	22. 3	25. 0	24. 8	29. 0	32. 8	32. 5	31. 6	31. 6	32. 2	33. 2	35. 3	29. 8
1923	35. 3	35. 3	37. 3	39. 2	41. 7	41. 5	38. 3	37. 0	37. 1	36. 9	36. 4	36. 2	38. 9
1924	36. 6	37. 5	38. 2	38. 4	37. 4	36. 0	34. 3	33. 5	35. 5	37. 3	40. 1	42. 2	36. 9
1925	42. 8	43. 2	43. 0	40. 8	36. 9	35. 7	39. 4	38. 1	37. 8	37. 2	37. 8	39. 5	38. 5
1926	38. 9	37. 7	34. 7	33. 2	32. 0	31. 4	31. 9	31. 9	32. 6	31. 6	31. 6	30. 1	32. 5
1927	30. 9	31. 1	31. 3	30. 4	30. 1	30. 2	30. 7	31. 2	31. 2	30. 9	31. 1	32. 0	30. 7
1928	33. 2	34. 4	35. 4	35. 6	37. 0	38. 7	37. 6	37. 0	36. 5	36. 0	35. 9	35. 6	36. 7
1929	35. 9	35. 9	35. 5	33. 8	31. 3	30. 2	29. 4	29. 2	29. 0	28. 6	28. 5	27. 8	30. 9
1930	27. 4	25. 9	23. 7	21. 4	19. 6	19. 2	19. 2	19. 8	20. 2	19. 6	19. 0	18. 4	20. 3
1931	17. 4	16. 4	15. 9	15. 6	14. 4	13. 0	12. 7	13. 1	13. 2	12. 5	13. 1	12. 9	13. 9

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by number of sheep Jan. 1, to obtain a price for the United States; yearly price obtained by using estimates of the division of crop and livestock estimates and the division of statistical and historical research.

TABLE 368.—*Wool: Boston market: Average price per pound, 1922–1931*

SCOURED BASIS, TERRITORY, GRADES 64's, 70's, 80's (FINE STRICTLY COMBING)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922	97	110	110	109	127	134	135	131	130	134	139	140	125
1923	143	144	144	149	153	150	144	137	132	130	130	134	141
1924	139	139	142	138	135	129	130	137	142	147	154	164	141
1925	168	164	153	138	126	130	137	132	129	128	131	131	139
1926	127	124	118	116	112	110	116	116	116	116	114	110	116
1927	110	110	110	109	108	108	111	111	111	112	112	112	110
1928	116	116	116	117	119	120	120	115	112	112	113	114	116
1929	114	110	108	104	100	97	94	94	93	90	88	84	98
1930	82	79	78	76	75	76	76	76	76	75	73	72	76
1931	68	66	66	66	64	62	62	64	62	59	59	59	63

SCOURED BASIS, TERRITORY, GRADE 56's (THREE-EIGHTS BLOOD STRICTLY COMBING)

1922	63	76	77	74	83	88	88	90	92	95	99	98	85
1923	100	103	105	107	111	111	109	105	103	101	104	108	106
1924	113	116	116	113	109	97	100	109	113	117	122	133	113
1925	136	136	125	109	96	99	105	101	102	102	108	109	110
1926	103	99	93	91	89	89	90	90	91	93	93	91	92
1927	90	90	90	90	88	88	90	91	91	94	94	94	91
1928	97	99	100	106	107	108	107	103	104	104	104	104	104
1929	104	104	101	95	89	88	88	90	90	89	87	82	92
1930	75	70	67	64	62	62	62	62	62	60	59	58	63
1931	55	52	51	51	48	46	49	51	51	48	48	48	50

GREASE BASIS, OHIO AND SIMILAR, GRADE 56's (THREE-EIGHTHS BLOOD STRICTLY COMBING)

1922	36	39	40	38	42	47	46	46	47	49	53	54	45
1923	55	56	56	56	56	57	56	54	53	52	53	54	55
1924	55	56	57	55	53	49	48	53	55	59	63	69	56
1925	70	69	66	55	46	49	53	52	50	52	54	54	56
1926	54	53	49	46	44	43	44	44	44	45	46	45	46
1927	45	45	45	44	42	42	43	44	45	46	47	48	45
1928	50	52	52	53	55	57	56	55	55	55	56	56	54
1929	56	55	54	50	45	44	45	45	45	45	44	42	48
1930	39	36	34	32	29	30	30	30	30	30	29	28	31
1931	26	25	24	23	22	22	22	23	24	24	24	24	24

Bureau of Agricultural Economics. 1922–1923 average of weekly range quotations from the Boston Commercial Bulletin, and 1924–1931 prices from the livestock and meat reporting service of the bureau.

TABLE 369.—*Goats and mohair: Estimates [1] of goats clipped, mohair clipped, and average clip per goat (principal producing States), 1920–1931*

GOATS CLIPPED

State	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
Texas [2]	1,834	1,984	1,750	1,797	2,008	2,020	2,550	2,640	3,070	3,200	3,518	3,570
New Mexico	124	128	110	110	127	120	135	165	170	186	209	236
Arizona	145	145	152	160	165	162	165	185	190	200	225	250
California	72	74	59	57	57	58	56	52	44	42	40	39
Oregon	113	115	105	103	101	110	115	115	125	120	120	115
Missouri	58	60	55	53	60	61	61	63	66	66	67	68
Total	2,346	2,506	2,231	2,280	2,518	2,531	3,082	3,220	3,665	3,814	4,179	4,278

MOHAIR (INCLUDING KID HAIR) PRODUCED

State	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
	1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
Texas	6,786	7,607	6,838	7,352	7,996	9,100	10,700	11,600	13,500	14,155	14,800	16,400
New Mexico	397	422	352	374	457	444	473	611	629	717	815	933
Arizona	464	479	517	560	611	599	594	703	741	800	900	1,000
California	230	244	207	211	217	220	207	187	158	147	140	136
Oregon	452	460	431	422	414	462	483	483	525	492	480	472
Missouri	145	150	143	148	162	171	171	176	178	165	168	170
Total	8,474	9,362	8,488	9,067	9,857	10,996	12,628	13,760	15,731	16,476	17,303	19,111

AVERAGE CLIP PER GOAT CLIPPED [3]

State	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
	Lbs.	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
Texas	3.7	3.8	3.9	4.1	4.0	4.5	4.2	4.4	4.4	4.4	4.2	4.6
New Mexico	3.2	3.3	3.2	3.4	3.6	3.7	3.5	3.7	3.7	3.9	3.9	4.0
Arizona	3.2	3.3	3.4	3.5	3.7	3.7	3.6	3.8	3.9	4.0	4.0	4.0
California	3.2	3.3	3.5	3.7	3.8	3.8	3.7	3.6	3.6	3.5	3.5	3.5
Oregon	4.0	4.0	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.1	4.0	4.1
Missouri	2.5	2.5	2.6	2.8	2.7	2.8	2.8	2.8	2.7	2.5	2.5	2.5
Average, 6 States	3.6	3.7	3.8	4.0	3.9	4.3	4.1	4.3	4.3	4.3	4.1	4.5

Bureau of Agricultural Economics.

[1] Figures for 1925–1930 are revisions of department's estimates previously published.
[2] Most goats clipped twice a year. In Texas, kids are clipped in the fall of year of birth. Figures include both goats and kids clipped.
[3] In States where goats are clipped twice a year figures include both spring and fall clip.

TABLE 370.—*Imported meat and meat products, federally inspected and passed, United States, 1921–22 to 1930–31*

Year beginning July 1—	Chilled and frozen fresh meats: Beef	Chilled and frozen fresh meats: Other	Canned and cured meats	Other meat products	Total weight
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*
1921–22	16,875,389	18,938,148	5,101,764	998,195	41,913,496
1922–23	25,999,968	12,871,364	9,635,315	1,341,067	49,847,714
1923–24	18,105,128	8,489,138	10,648,605	1,391,060	38,633,931
1924–25	5,612,600	11,827,557	12,857,043	2,877,640	33,174,840
1925–26	9,975,359	12,402,230	19,258,401	3,144,968	44,780,958
1926–27	14,956,143	22,508,681	43,714,607	5,454,741	86,634,172
1927–28	38,168,121	18,880,547	63,189,480	12,102,635	132,340,783
1928–29	53,085,288	15,704,658	89,511,853	11,563,215	169,865,014
1929–30	23,909,708	6,783,637	98,128,169	8,065,195	136,886,709
1930–31	2,612,713	1,314,170	23,854,583	5,651,509	33,423,975

Bureau of Animal Industry.

TABLE 371.—*Livestock: Number of animals slaughtered at federally inspected plants and number of whole carcasses condemned,*[1] *1921–22 to 1930–31*

Year beginning July—	Cattle		Calves		Sheep		Goats		Swine		Horses		Total slaughter
	Slaughter	Condemned	Slaughter	Condemned	Slaughter	Condemned	Slaughter	Condemned	Slaughter	Condemned	Slaughter	Condemned	
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
1921-22	7, 871	55. 2	3, 924	11. 4	11, 968	10. 5	14	0. 0	39, 416	160. 1	2	0. 0	63, 196
1922-23	9, 030	73. 3	4, 338	11. 8	11, 404	13. 3	25	. 1	48, 600	196. 3	1	. 0	73, 398
1923-24	9, 189	83. 9	4, 668	12. 7	11, 505	12. 9	31	. 3	54, 416	232. 7	5	. 0	79, 814
1924-25	9, 774	92. 1	5, 185	11. 1	12, 203	12. 7	27	. 1	48, 460	180. 4	12	. 0	75, 660
1925-26	10, 098	103. 6	5, 312	11. 9	12, 354	14. 5	43	. 1	40, 443	143. 0	40	. 1	68, 289
1926-27	10, 050	83. 5	5, 080	10. 6	12, 894	16. 4	30	. 1	42, 650	173. 6	43	. 2	70, 747
1927-28	9, 040	69. 4	4, 774	9. 9	12, 984	15. 4	20	. 1	48, 347	154. 2	107	. 3	75, 273
1928-29	8, 284	61. 9	4, 526	8. 9	13, 769	20. 1	21	. 1	47, 164	139. 4	117	. 4	73, 881
1929-30	8, 281	59. 5	4, 491	9. 5	15, 307	22. 9	22	. 1	46, 689	135. 4	136	. 5	74, 926
1930-31	8, 209	52. 4	4, 732	9. 1	17, 300	18. 5	9	. 1	44, 021	121. 8	135	. 7	74, 406

Bureau of Animal Industry.

[1] The numbers of condemned carcasses are expressed in thousands and tenths; that is, the last figure represents hundreds.

TABLE 372.—*Meat and meat products prepared under Federal inspection, 1921–22 to 1930–31*

Year beginning July—	Pork placed in cure	Sausage	Canned meats	Lard	Lard compounds and substitutes	Oleo products	Oleomargarine	All other products	Total
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
1921-22	2, 725, 031	568, 626	109, 481	1, 659, 331	312, 014	268, 034	118, 197	1, 666, 403	7, 427, 117
1922-23	3, 366, 258	679, 317	160, 282	2, 017, 763	336, 851	278, 137	129, 768	1, 920, 171	8, 888, 547
1923-24	3, 502, 368	707, 323	183, 260	2, 110, 660	363, 320	259, 008	142, 881	2, 136, 020	9, 404, 840
1924-25	3, 176, 714	736, 877	214, 650	1, 733, 933	458, 518	287, 271	133, 836	2, 170, 278	8, 912, 077
1925-26	2, 850, 675	771, 741	214, 166	1, 598, 754	543, 913	275, 636	148, 331	2, 007, 854	8, 411, 070
1926-27	2, 920, 206	765, 074	248, 459	1, 691, 344	535, 175	280, 641	148, 384	1, 971, 827	8, 561, 110
1927-28	3, 036, 063	778, 311	255, 379	1, 846, 796	472, 839	237, 506	152, 085	2, 201, 933	8, 980, 912
1928-29	2, 992, 898	785, 463	285, 808	1, 817, 601	467, 077	228, 531	158, 881	2, 210, 438	8, 946, 697
1929-30	2, 981, 864	783, 629	303, 094	1, 807, 144	433, 495	223, 889	159, 413	2, 268, 407	8, 960, 935
1930-31	2, 851, 938	697, 798	283, 547	1, 662, 397	482, 482	212, 925	117, 819	2, 135, 789	8, 444, 695

Bureau of Animal Industry. The above figures do not represent production, as a product may be inspected more than once in course of further manufacture.

TABLE 373.—*Meat and meat products: International trade, average 1925–1929, annual 1928–1930*

Country	Calendar year: Average 1925–1929		1928		1929		1930[1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Argentina	2,028,126	465	1,751,434	613	1,701,510	427	1,552,620	323
United States	1,421,054	147,765	1,335,802	194,161	1,448,801	217,795	1,183,014	97,765
Denmark	640,468	26,692	721,893	28,549	681,512	28,429	875,694	28,156
Netherlands	534,982	206,537	558,807	180,100	458,530	158,485	438,879	175,253
New Zealand	442,571	1,102	494,525	1,062	428,335	1,198	514,666	1,027
Uruguay	396,117	15	341,890	0	336,659	0	[2] 402,247	0
Australia[3]	380,162	6,691	311,561	8,425	383,319	7,808	344,543	4,212
Canada	144,720	27,305	116,352	27,179	81,528	40,774	35,045	39,835
Brazil	131,003	10,511	176,052	10,106	201,914	6,417	288,230	6,953
Irish Free State	105,959	66,964	135,551	57,194	110,625	59,541	90,303	61,470
Poland	71,019	45,836	64,673	68,364	68,938	55,447	106,227	39,861
Sweden	61,961	46,886	68,596	44,111	63,362	48,848	87,300	50,325
China	48,376	3,672	44,153	4,385	41,082	4,000	43,906	3,563
Chile	40,829	4,206	46,562	1,104	44,991	2,942	39,452	
Hungary	33,182	6,733	14,864	10,644	19,691	2,195	32,709	3,684
Yugoslavia	27,751	9,664	21,205	10,494	22,364	12,985	15,566	10,264
Union of South Africa	24,581	15,656	19,090	16,640	27,495	15,687	32,102	11,885
Rumania	21,049	[4] 1,037	[2] 11,812	[2]	[2] 13,755	[2] 6	[2] 19,093	[2] 4
Total	6,553,910	627,737	6,234,822	663,131	6,134,411	662,979	6,101,596	534,580
Total beef	2,872,975	251,128	2,556,147	254,535	2,434,220	228,233	2,464,614	183,771
Total pork	2,274,327	150,315	2,347,847	162,847	2,272,588	147,748	2,146,363	128,259
Total mutton and lamb	607,310	1,430	582,960	1,122	633,358	962	736,033	794
Total unclassified	799,298	224,864	747,868	244,627	794,235	286,036	754,586	221,756
Total	6,553,910	627,737	6,234,822	663,131	6,134,411	662,979	6,101,596	534,580
PRINCIPAL IMPORTING COUNTRIES								
United Kingdom	127,797	3,827,365	114,738	3,855,378	112,301	3,708,244	140,094	3,894,405
Germany	42,080	838,653	48,022	703,269	55,142	670,475	78,441	570,656
France	62,427	299,085	77,572	229,425	73,158	176,678	67,952	270,023
Italy	18,680	233,627	13,027	215,229	10,866	230,546	14,482	206,397
Belgium	60,122	213,736	56,402	168,075	39,684	184,671	36,423	194,705
Cuba	750	180,592	1,465	177,609	2,285	168,102	2,231	132,935
Austria	8,495	124,462	11,413	127,582	9,915	121,616	9,969	105,192
Czechoslovakia	9,837	101,778	10,544	85,941	10,602	100,048	8,634	83,045
Japan	115	68,636	368	68,918	208	70,088	138	71,263
Mexico	7,200	65,814	6,085	87,376	4,017	2,520	1,135	95,349
Norway	3,107	36,970	3,552	33,640	3,957	30,705	2,779	28,261
Spain	6,116	31,148	3,263	31,239	2,719	34,883	5,342	27,308
Switzerland	3,383	30,242	3,335	30,850	3,258	31,468	3,019	30,469
Finland	4,565	19,972	1,819	26,477	1,297	20,245	2,943	13,519
Philippine Islands	0	19,812	0	19,767	0	21,607	0	14,845
British Malaya	2,336	15,306	2,563	16,529	2,249	16,323	1,985	13,628
British India	1,254	13,250	1,390	11,158	1,247	12,813	978	12,819
Peru	590	12,912	1,180	10,707	1,194	11,029	1,728	
Algeria	1,820	12,557	2,122	13,082	1,644	13,040	1,399	14,119
Egypt	144	7,603	132	8,070	147	8,599	108	4,689
Total	360,818	6,153,520	358,992	5,920,321	335,890	5,633,700	379,780	5,783,627
Total beef	126,843	2,696,113	125,886	2,465,322	105,541	2,254,639	160,937	2,241,949
Total pork	32,982	2,163,324	29,532	2,172,953	27,523	2,093,663	34,532	2,128,210
Total mutton and lamb	4,185	680,356	3,027	688,845	2,715	701,848	5,846	796,005
Total unclassified	196,808	613,727	200,547	593,201	200,111	583,550	178,465	617,463
Total	360,818	6,153,520	358,992	5,920,321	335,890	5,633,700	379,780	5,783,627

Bureau of Agricultural Economics. Official sources except where otherwise noted.

[1] Preliminary.
[2] International Yearbook of Agricultural Statistics.
[3] Year ended June 30.
[4] 4-year average.

TABLE 374.—*Meats, western dressed, fresh and smoked: Average wholesale price per 100 pounds at Chicago and New York, by years, 1929–1931*

BEEF AND VEAL

Year	Chicago							New York						
	Steer beef					Cow beef, Good	Vealers,[1] Good	Steer beef					Cow beef, Good	Vealers,[1] Good
	Choice		Good		Medium, 500 pounds up			Choice		Good		Medium, 500 pounds up		
	700 pounds up	550 to 700 pounds	700 pounds up	550 to 700 pounds				700 pounds up	550 to 700 pounds	700 pounds up	550 to 700 pounds			
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1929	21.93	22.67	20.71	21.26	18.96	17.28	22.86	22.96	23.22	21.49	21.60	19.17	17.94	24.08
1930	18.83	19.64	17.16	17.45	15.34	13.68	17.90	19.53	19.95	17.86	18.16	15.77	14.56	20.39
1931	14.51	15.10	13.01	13.40	11.18	9.96	12.79	15.36	15.67	13.69	13.99	11.54	10.43	15.10

PORK CUTS

Year	Chicago						New York					
	Fresh pork			Cured pork and lard			Fresh pork			Cured pork and lard		
	Ham, 10 to 14 pounds	Loins, 12 to 15 pounds	Shoulders, New York style, skinned, 8 to 12 pounds	Hams, smoked, regular, No. 2, 14 to 16 pounds	Bacon, No. 1, smoked, dry cure, 6 to 8 pounds	Lard, refined (hardwood tubs)	Hams, 10 to 14 pounds	Loins, 12 to 15 pounds	Shoulders, New York style, skinned, 8 to 12 pounds	Hams, smoked, regular, No. 2, 10 to 12 pounds	Bacon, No. 1, smoked, sweet-pickle cure, 8 to 10 pounds	Lard, refined (hardwood tubs)
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1929	21.29	21.17	16.07	24.10	30.16	12.97	23.12	21.66	17.72	23.88	22.21	13.70
1930	19.66	19.61	15.36	23.08	30.58	12.02	22.40	20.40	16.74	22.64	23.39	12.57
1931	12.99	14.00	10.05	16.76	24.30	9.02	16.12	15.00	11.91	17.61	18.41	9.84

LAMB AND MUTTON

Year	Chicago							New York						
	Lamb						Mutton, Good, 70 pounds down	Lamb						Mutton, Good, 70 pounds down
	Choice		Good		Medium, 38 pounds down	Common, 38 pounds down		Choice		Good		Medium, 38 pounds down	Common, 38 pounds down	
	38 pounds down	39 to 45 pounds	38 pounds down	39 to 45 pounds				38 pounds down	39 to 45 pounds	38 pounds down	39 to 45 pounds			
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1929	27.73	27.44	26.57	26.30	24.70	22.57	14.78	28.58	27.75	27.29	26.52	25.47	23.61	14.65
1930	21.18	20.69	19.58	19.22	17.33	14.76	10.83	21.88	21.34	20.75	20.25	19.00	17.08	11.33
1931	17.51	17.24	16.04	15.78	14.07	12.00	8.62	18.17	17.88	16.89	16.63	15.29	13.11	9.15

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-reporting service of the bureau. Earlier data in 1927 Yearbook, pp. 1050–1055, and in 1928 Yearbook, pp. 964–966.

[1] Hide on.

TABLE 375.—*Hides, packer: Average price per pound at Chicago, 1922–1931*

Calendar year	Steers					Cows			Bulls	
	Heavy native	Heavy Texas	Light Texas	Butt branded	Colorados	Heavy native	Light native	Branded	Native	Branded
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922	17.83	16.57	15.29	16.51	15.59	16.10	15.16	13.47	11.96	10.15
1923	16.46	14.79	13.77	14.89	13.86	14.21	12.94	11.11	11.69	9.89
1924	14.67	13.82	12.80	13.80	12.79	12.95	12.29	10.41	10.14	8.79
1925	15.96	15.08	14.06	15.16	14.12	14.82	14.62	13.30	11.98	10.29
1926	14.08	13.38	12.67	13.34	12.82	12.71	13.11	12.05	9.98	8.50
1927	19.28	18.21	17.49	18.23	17.74	18.08	18.66	17.26	14.09	12.88
1928	23.85	22.91	22.26	22.95	22.26	22.96	22.63	21.79	17.64	16.62
1929	16.98	16.08	15.16	16.11	15.39	15.86	15.75	14.86	11.42	10.17
1930	13.87	13.76	12.55	13.73	13.18	11.78	11.71	11.19	8.30	7.30
1931	9.06	8.96	8.34	8.96	8.48	8.04	8.43	7.76	5.53	4.78

Bureau of Agricultural Economics. Compiled from annual reports of the Chicago Board of Trade Data 1893–1919 available in 1925 Yearbook, p. 1199, Table 610.

TABLE 376.—*Hides, country: Average price per pound at Chicago, 1922–1931*

Calendar year	Extremes	Heavy steers	Heavy cows	No. 1 buffs	No. 2 buffs	Bulls	Country packer brands	Country brands	No. 1 calfskins	No. 1 kipskins
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922	12.93	12.03	10.85	10.86	9.52	8.23	12.53	8.42	18.95	17.29
1923	11.65	11.39	10.43	10.45	9.26	8.93	10.12	8.70	17.18	15.42
1924	11.86	11.31	9.24	9.63	8.63	7.86	9.81	8.23	20.39	16.62
1925	14.41	12.94	11.64	12.26	11.25	9.46	12.52	10.54	21.88	18.12
1926	13.46	11.63	9.54	10.70	9.70	8.03	10.52	9.00	18.02	16.12
1927	18.60	16.02	14.85	16.26	15.26	11.49	15.54	13.89	20.47	19.96
1928	22.04	18.53	18.05	19.71	18.71	14.88	19.18	17.38	27.84	25.23
1929	14.98	12.09	11.55	12.82	11.82	8.92	11.88	10.80	20.72	18.72
1930	11.18	8.50	8.40	9.14	8.14	5.90	9.49	7.73	17.43	15.92
1931	7.77	6.02	5.61	6.32	5.32	3.99	6.70	5.05	11.81	10.42

Bureau of Agricultural Economics. Compiled from annual reports of the Chicago Board of Trade.

TABLE 377.—*Meats and lard: Estimated total production and per capita consumption in United States*

Calendar year	Production					Per capita consumption					
	Beef	Veal	Lamb and mutton	Pork (excl. lard)	Lard	Beef	Veal	Lamb and mutton	Pork (excl. lard)	Total meats	Lard
	Million pounds	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
1900	5,694	265	517	5,912	1,617	67.8	3.5	6.8	64.7	142.8	13.2
1901	5,919	305	538	5,895	1,614	69.0	3.9	6.9	63.0	142.8	12.9
1902	5,922	346	561	5,334	1,439	68.5	4.4	7.0	57.8	137.7	11.7
1903	6,689	384	582	5,465	1,496	76.0	4.7	7.2	59.3	147.2	11.8
1904	6,548	425	564	5,867	1,596	73.6	5.1	6.8	62.8	148.3	12.4
1905	6,680	455	545	5,748	1,551	73.0	5.4	6.5	58.8	143.7	10.0
1906	6,711	464	555	5,976	1,644	72.6	5.4	6.5	59.7	144.2	11.2
1907	7,192	589	560	6,333	1,777	77.5	6.7	6.4	64.4	155.1	13.5
1908	6,642	573	559	6,617	1,790	71.5	6.4	6.3	66.1	150.3	13.5
1909	7,041	628	603	6,024	1,504	75.4	6.9	6.6	60.1	149.2	11.5
1910	6,703	632	599	5,649	1,434	71.1	6.8	6.4	57.1	141.6	11.4
1911	6,466	597	732	6,596	1,673	67.7	6.4	7.8	64.5	146.5	11.3
1912	5,888	598	779	6,407	1,626	61.1	6.3	8.1	61.8	137.4	11.2
1913	5,881	491	731	6,622	1,681	60.6	5.1	7.5	63.0	136.3	11.4
1914	5,606	443	712	6,530	1,657	58.5	4.6	7.4	62.3	133.0	12.2
1915	5,779	427	622	6,971	1,775	54.5	4.3	6.3	59.5	124.8	12.9
1916	6,075	535	608	7,386	1,849	56.0	5.3	6.1	60.1	127.7	13.6
1917	6,641	661	473	6,139	1,557	59.5	6.5	4.6	49.3	120.1	11.7
1918	7,279	764	493	7,854	1,983	63.0	7.4	4.7	54.8	130.1	13.3
1919	6,758	803	603	7,832	2,039	61.6	7.7	5.8	54.8	130.0	12.3
1920	6,713	797	532	7,455	2,056	63.1	7.6	5.5	60.5	136.8	13.3
1921	6,163	747	626	7,645	2,114	56.9	7.0	5.9	63.5	133.3	11.3
1922	6,706	792	535	8,260	2,357	60.4	7.3	5.0	66.1	138.8	14.2
1923	6,873	862	571	9,595	2,783	61.4	7.7	5.2	74.7	149.0	15.3
1924	7,065	925	589	9,279	2,746	61.6	8.2	5.2	74.7	149.7	15.4
1925	7,146	1,001	599	8,255	2,223	62.2	8.7	5.2	67.6	143.7	13.2
1926	7,458	960	643	8,181	2,324	63.6	8.2	5.5	65.7	143.0	13.5
1927	6,826	867	645	8,533	2,356	58.4	7.4	5.4	68.5	139.7	13.8
1928	6,082	814	671	9,387	2,594	51.7	6.8	5.6	73.9	138.0	14.7
1929	6,065	816	699	9,223	2,598	51.4	6.8	5.8	72.8	136.8	14.3
1930	6,076	833	820	8,809	2,344	50.1	6.8	6.6	68.2	131.7	13.8

Bureau of Agricultural Economics.

TABLE 378.—*Horses and mules: Number and value on farms in the United States, January 1, 1910–1932*

Year	Horses			Mules		
	Number	Value per head	Farm value	Number	Value per head	Farm value
	Thousands	*Dollars*	*1,000 dollars*	*Thousands*	*Dollars*	*1,000 dollars*
1910	19, 833	108. 03	2, 142, 524	4, 210	120. 20	506, 049
1911	20, 277	111. 46	2, 259, 981	4, 323	125. 92	544, 359
1912	20, 509	105. 94	2, 172, 694	4, 362	120. 51	525, 657
1913	20, 567	110. 77	2, 278, 222	4, 386	124. 31	545, 245
1914	20, 962	109. 32	2, 291, 638	4, 449	123. 85	551, 017
1915	21, 195	103. 33	2, 190, 102	4, 479	112. 36	503, 271
1916	21, 159	101. 60	2, 149, 786	4, 593	113. 83	522, 834
1917	21, 210	102. 89	2, 182, 307	4, 723	118. 15	558, 006
1918	21, 555	104. 24	2, 246, 970	4, 873	128. 81	627, 679
1919	21, 482	98. 45	2, 114, 897	4, 954	135. 83	672, 922
1920	20, 092	96. 48	1, 938, 447	5, 656	148. 25	838, 530
1921	19, 366	84. 54	1, 637, 181	5, 772	117. 37	677, 475
1922	18, 760	71. 05	1, 332, 822	5, 827	88. 99	518, 558
1923	18, 123	70. 51	1, 277, 873	5, 895	86. 86	512, 067
1924	17, 365	65. 42	1, 135, 967	5, 908	85. 89	507, 435
1925	16, 640	64. 28	1, 069, 654	5, 918	82. 91	490, 668
1926	16, 067	65. 32	1, 049, 442	5, 903	81. 51	481, 153
1927	15, 368	63. 74	979, 509	5, 801	74. 50	432, 181
1928	14, 768	66. 68	984, 763	5, 647	79. 79	450, 585
1929	14, 203	69. 63	988, 953	5, 496	82. 39	452, 825
1930	13, 684	69. 86	955, 964	5, 366	83. 76	449, 480
1931	13, 165	60. 43	795, 541	5, 215	69. 17	360, 736
1932 [1]	12, 679	53. 37	676, 698	5, 082	60. 69	308, 440

Bureau of Agricultural Economics. Estimates of the crop-reporting board.
Figures for earlier years are shown in 1923 yearbook. Figures for the years 1920–1931 were revised January, 1932.

[1] Preliminary.

TABLE 379.—*Horses: Price per head received by producers, United States, 1922–1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weighted average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922	82	84	86	87	89	88	88	86	84	81	79	79	84
1923	81	85	85	86	88	87	85	83	82	80	78	75	82
1924	73	74	75	76	78	77	77	79	78	77	76	73	76
1925	73	78	81	83	82	81	81	80	77	76	75	74	78
1926	75	80	82	84	84	83	82	80	78	77	75	73	79
1927	73	77	79	80	81	80	80	80	78	76	75	75	78
1928	77	82	85	85	86	86	85	84	82	80	79	78	82
1929	77	79	83	85	85	84	84	82	82	79	78	77	81
1930	77	77	78	79	79	77	73	70	69	68	66	64	80
1931	65	67	69	69	69	67	64	62	60	58	57	56	65

Bureau of Agricultural Economics. Based on returns from special-price reporters. Monthly prices, by states, weighted by number of horses Jan. 1, to obtain a price for the United States; yearly prices obtained by weighting monthly prices by receipts at public stockyards.

TABLE 380.—*Mules: Price per head received by producers, United States, 1926–1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weighted average
1926	$92	$96	$97	$100	$99	$99	$96	$95	$94	$90	$85	$85	$94
1927	83	88	91	92	91	92	91	90	90	90	91	91	90
1928	93	97	100	102	102	102	101	100	96	96	94	93	96
1929	94	96	99	101	101	100	99	96	96	96	94	93	96
1930	93	94	95	96	95	94	88	80	78	78	77	74	91
1931	74	76	78	80	79	77	73	70	67	65	65	63	74

Bureau of Agricultural Economics. Based on returns of special-price reporters. Monthly prices by States, weighted by number of mules Jan. 1, to obtain a price for the United States.

TABLE 381.—*Horses and horse colts: Estimated number on farms and value per head, by States, January 1, 1928–1932*

State and division	Number					Value per head [1]				
	1928 [2]	1929 [2]	1930 [2]	1931 [2]	1932 [3]	1928	1929	1930	1931	1932
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Maine	74	67	63	59	57	135.00	140.00	143.00	115.00	114.00
New Hampshire	26	23	21	19	18	120.00	121.00	127.00	113.00	95.00
Vermont	56	55	53	51	50	119.00	124.00	131.00	109.00	102.00
Massachusetts	33	29	26	24	24	135.00	130.00	135.00	133.00	108.00
Rhode Island	5	4	4	4	4	135.00	130.00	140.00	135.00	100.00
Connecticut	27	24	22	21	21	140.00	145.00	147.00	137.00	110.00
New York	369	349	325	312	303	116.00	124.00	128.00	115.00	107.00
New Jersey	47	44	40	37	35	109.00	114.00	124.00	112.00	102.00
Pennsylvania	350	331	317	309	297	112.00	116.00	120.00	108.00	104.00
North Atlantic	987	926	871	836	809	117.34	122.51	126.90	112.82	105.41
Ohio	542	520	504	484	469	101.00	105.00	107.00	93.00	87.00
Indiana	517	484	456	438	425	82.00	82.00	82.00	76.00	73.00
Illinois	882	856	830	805	773	74.00	77.00	79.00	69.00	60.00
Michigan	420	404	389	381	373	98.00	110.00	111.00	98.00	97.00
Wisconsin	562	557	550	544	534	98.00	102.00	102.00	91.00	77.00
North Central, East	2,923	2,821	2,729	2,652	2,574	88.48	92.68	93.68	83.26	76.07
Minnesota	819	813	807	791	775	79.00	82.00	82.00	71.00	56.00
Iowa	1,106	1,073	1,058	1,037	996	75.00	79.00	80.00	68.00	56.00
Missouri	638	625	610	592	574	50.00	53.00	54.00	45.00	40.00
North Dakota	665	643	616	604	586	54.00	53.00	52.00	44.00	41.00
South Dakota	661	641	624	605	581	53.00	57.00	53.00	45.00	36.00
Nebraska	788	772	757	719	697	60.00	61.00	61.00	52.00	44.00
Kansas	798	758	728	699	685	43.00	49.00	48.00	38.00	37.00
North Central, West	5,475	5,325	5,200	5,047	4,894	60.66	63.74	63.45	53.77	45.55
North Central	8,398	8,146	7,929	7,699	7,468	70.34	73.76	73.85	63.93	56.07
Delaware	20	19	18	17	17	79.00	90.00	93.00	82.00	64.00
Maryland	100	97	95	93	91	89.00	92.00	97.00	83.00	68.00
Virginia	221	212	205	195	187	70.00	78.00	83.00	68.00	66.00
West Virginia	127	122	116	112	106	84.00	89.00	91.00	79.00	70.00
North Carolina	106	98	89	83	77	87.00	86.00	85.00	76.00	65.00
South Carolina	42	36	31	28	26	81.00	82.00	83.00	69.00	54.00
Georgia	41	39	38	36	35	78.00	78.00	77.00	63.00	52.00
Florida	25	23	21	20	19	83.00	87.00	87.00	77.00	67.00
South Atlantic	682	646	613	584	558	79.93	84.29	87.07	74.23	65.67
Kentucky	280	258	248	231	222	53.00	56.00	60.00	51.00	47.00
Tennessee	201	193	182	169	157	60.00	60.00	65.00	56.00	49.00
Alabama	76	71	66	62	58	66.00	66.00	65.00	51.00	46.00
Mississippi	115	110	104	98	92	61.00	58.00	58.00	45.00	43.00
Arkansas	156	148	141	133	132	43.00	41.00	43.00	32.00	31.00
Louisiana	121	119	118	112	106	52.00	53.00	52.00	46.00	38.00
Oklahoma	548	527	507	482	453	38.00	39.00	39.00	33.00	30.00
Texas	860	820	780	741	704	45.00	47.00	46.00	35.00	30.00
South Central	2,357	2,246	2,146	2,028	1,924	47.29	48.34	48.61	39.41	35.17
Montana	525	498	462	430	400	31.00	31.00	30.00	27.00	23.00
Idaho	216	211	206	198	190	51.00	54.00	51.00	44.00	36.00
Wyoming	186	181	176	171	166	31.00	32.00	34.00	34.00	26.00
Colorado	343	343	338	331	324	43.00	47.00	44.00	41.00	34.00
New Mexico	161	151	142	135	128	31.00	35.00	33.00	28.00	23.00
Arizona	102	90	80	77	74	49.00	51.00	51.00	43.00	41.00
Utah	102	97	92	90	87	61.00	63.00	62.00	54.00	38.00
Nevada	43	41	40	39	38	60.00	58.00	54.00	48.00	46.00
Washington	209	196	184	171	161	65.00	68.00	63.00	55.00	49.00
Oregon	194	186	178	169	162	65.00	65.00	61.00	53.00	44.00
California	263	245	227	207	190	74.00	78.00	78.00	69.00	59.00
Western	2,344	2,239	2,125	2,018	1,920	47.89	49.86	48.07	42.50	35.62
United States	14,768	14,203	13,684	13,165	12,679	66.68	69.63	69.86	60.43	53.37

Bureau of Agriculture Economics. Estimates of the crop-reporting board.

[1] Sum of total value of subgroups (classified by age), divided by total number and rounded to nearest dollar for States. Division and United States averages not rounded.

[2] Revised, January, 1932. For revisions of numbers, by States, for years earlier than 1928, see February, 1932, issue of Crops and Markets.

[3] Preliminary.

TABLE 382.—*Horses: Number in countries having 80,000 and over, average 1921–1925, annual 1926–1931*

Country	Month of estimate	Average 1921–1925 [1]	1926	1927	1928	1929	1930	1931
North America, Central America, and West Indies:		*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
United States—								
On farms	Jan. 1	18,051	16,067	15,368	14,768	14,203	13,684	13,165
Not on farms		[2] 1,706						
Canada	June	3,627	3,398	3,422	3,376	3,376	3,295	
Mexico		[3] 930	1,036					
Guatemala	July	70	94	75	53	59	63	
Costa Rica		105	127	126	102	85		
Cuba	December [4]	844	685	747	716	634	758	634
Dominican Republic	April	136						
Haiti			110	115	125	125		
Estimated total [5]		25,800						
South America:								
Columbia		971	980	978		929		
Venezuela		168						
Ecuador		85				85		
Peru		156				[2] 432		
Bolivia	December [4]	(150)	204	320		376		
Chile		482					[2] 441	
Brazil	September	[2 3] 5,254						
Uruguay		[2 6] 613					[2] 500	
Paraguay	December [4]	[7] 490						
Argentina	June and December [4]	9,432					[2] 9,858	
Estimated total [5]		17,800						
Europe:								
England and Wales	June	1,280	1,129	1,077	1,038	999	961	938
Scotland	do	202	179	172	166	161	157	153
North Ireland [8]	do	98	91	89	87	86	87	86
Irish Free State [8]	do	332	327	319	321	319	325	326
Norway [9]	do	188	183	183	182	177	177	177
Sweden	do	[10] 664		620			653	
Denmark	July	564	548	525	519	521	594	498
Netherlands	May–June	[2] 364					[2] 299	
Belgium	December [4]	230	250	250	256	253	249	
France	do.[4]	2,765	2,880	2,894	2,927	2,936	2,986	2,924
Spain	do.[4]	634	698	719		[2] 598		
Portugal	October–March	80						
Italy	March	1,008		1,050			[2] 967	
Switzerland	April	134	140				140	
Germany	December [4]	3,690	3,917	3,873	3,810	3,718	3,617	
Austria	do.[4]	268					[2] 248	
Czechoslovakia	do.[4]	591	[2] 740				[2] 747	
Hungary	Spring or summer	814	885	903	918	892	860	865
Yugoslavia	January	1,067	1,117	1,120	1,109	1,140		1,161
Greece	December [4]	208	270	281	277	290	323	
Bulgaria	do.[4]	[2] 342						
Rumania	do.[4]	1,729	1,815	1,778	1,831	1,850	1,867	1,809
Poland	November	3,290		4,069		4,047	4,103	4,123
Lithuania	Spring	470	535	617	611	588	559	
Latvia	do	324	365	369	365	356	359	366
Estonia	Spring or summer	210	226	230	228	205	204	
Finland	September	399	400	396	394	395		
Russia, European and Asiatic.	Spring	24,611	28,428	31,538	33,506	34,606	31,158	
Estimated total [5]		22,100						
Africa:								
Morocco		174	196	194	187	197	206	
Algeria	March	161	167	162	164	163	173	
Tunis	December [4]	73	72	87	92	88	89	95
French West Africa and French Sudan.		148	196	207	205	236	240	
Nigeria, including British Cameroons.		173	182	182	203	197	184	
Union of South Africa	Spring or summer	925	888					
Basutoland		166	244	250	250	205	137	
Estimated total [5]		2,000						

See footnotes at end of table.

TABLE 382.—*Horses: Number in countries having 80,000 and over, average 1921–1925, annual 1926–1931*—Continued

Country	Month of e timate	Average 1921–1925 [1]	1926	1927	1928	1929	1930	1931
		Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
Asia:								
Turkey, European and Asiatic.	Summer	452	537	459	485	497	501	
Persia		[10] [11] 1,500						
India—								
British	December–April	1,747	1,684	1,691	1,726	1,728	[2] 1,701	
Native States	do	502	445	466	464	491	[2] 557	
China, including Manchuria and Turkestan.		4,900				[10] 4,500		
Japan	December [4]	1,545	1,553	1,486	1,495	1,494	1,490	
French Indo-China		107	97	98	97	97	97	
Siam	Mar. 31	183	247	265	283	298		
Philippine Islands [11]	December [4]	281	294	309	318	332		
Dutch East Indies—								
Java and Madura	do.[4]	273	267	259	258	248	252	249
Outer possessions	do.[4]	443	463	452	451	458	456	432
Estimated total [5]		12,100						
Oceania:								
Australia	December [4]	2,373	2,250	2,123	2,041	1,943	1,846	
New Zealand	Jan. 31	328	315	304	307	299	297	
Estimated total [5]		2,700						
Total, all countries reported, all periods, including Russia—								
To 1930 (35) [12]		68,972	70,940	73,130	74,380	74,570	70,509	
To 1931 (15) [12] [13]		27,980	25,956	25,222	24,639	23,928	23,612	22,717
Estimated world total [5]		107,100						

Bureau of Agricultural Economics. Compiled from official sources and the International Institute of Agriculture. Figures in parenthesis are interpolated.

[1] Average for 5-year period if available, otherwise for any year or years within this period except as otherwise stated.
[2] Census.
[3] 1920.
[4] Estimates for countries reporting as of December have been considered as of Jan. 1 of the following year; i. e., horses as reported in France for Dec. 31, 1926, have been placed in the 1927 column.
[5] Includes interpolations for a few countries not reporting each year and rough estimates for some others.
[6] 1924.
[7] 1918.
[8] Incomplete. Refers to horses used in agriculture only for Northern Ireland and Irish Free State.
[9] Rural communities only.
[10] Unofficial.
[11] Includes mules and asses.
[12] Comparable totals for the number of countries indicated.
[13] Excluding Russia.

TABLE 383.—*Mules and mule colts: Estimated number on farms and value per head, by States, January 1, 1928–1932*

State and division	Number					Value per head [1]				
	1928 [2]	1929 [2]	1930 [2]	1931 [2]	1932 [3]	1928	1929	1930	1931	1932
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Maine										
New Hampshire										
Vermont										
Massachusetts										
Rhode Island										
Connecticut										
New York	7	6	6	6	6	125.00	120.00	127.00	127.00	102.00
New Jersey	4	4	4	3	3	118.00	123.00	130.00	130.00	119.00
Pennsylvania	51	51	51	50	50	121.00	127.00	129.00	117.00	111.00
North Atlantic	62	61	61	59	59	121.26	126.05	128.98	118.80	110.61
Ohio	33	32	32	32	32	102.00	101.00	107.00	94.00	89.00
Indiana	97	90	86	86	83	86.00	88.00	89.00	83.00	77.00
Illinois	150	142	136	132	129	82.00	86.00	88.00	79.00	69.00
Michigan	7	6	6	6	6	93.00	102.00	110.00	93.00	89.00
Wisconsin	7	7	7	7	7	95.00	95.00	92.00	79.00	74.00
North Central, East	294	277	267	263	257	86.14	88.96	91.43	82.31	74.78
Minnesota	15	15	15	15	15	83.00	83.00	85.00	74.00	63.00
Iowa	95	90	85	83	81	84.00	86.00	90.00	76.00	64.00
Missouri	330	313	300	297	291	68.00	75.00	76.00	64.00	55.00
North Dakota	9	8	8	8	8	57.00	55.00	59.00	49.00	45.00
South Dakota	19	19	19	18	18	63.00	63.00	64.00	56.00	46.00
Nebraska	112	106	99	95	91	75.00	76.00	79.00	62.00	57.00
Kansas	203	185	160	155	143	60.00	65.00	66.00	58.00	52.00
North Central, West	783	736	686	671	647	68.91	73.61	75.68	63.54	55.47
North Central	1,077	1,013	953	934	904	73.61	77.81	80.09	68.83	60.96
Delaware	10	10	10	10	10	95.00	96.00	104.00	100.00	93.00
Maryland	29	29	29	29	29	113.00	111.00	118.00	105.00	95.00
Virginia	98	97	96	94	93	92.00	97.00	101.00	85.00	84.00
West Virginia	14	14	13	13	12	81.00	86.00	95.00	83.00	74.00
North Carolina	284	282	282	276	273	119.00	124.00	120.00	114.00	89.00
South Carolina	187	183	180	176	176	105.00	105.00	109.00	92.00	74.00
Georgia	347	344	344	340	333	105.00	109.00	105.00	87.00	70.00
Florida	43	42	42	42	42	119.00	124.00	125.00	106.00	97.00
South Atlantic	1,012	1,001	996	980	968	108.06	111.57	110.58	96.69	79.62
Kentucky	284	270	257	246	241	67.00	69.00	77.00	64.00	59.00
Tennessee	342	335	328	321	318	75.00	80.00	89.00	73.00	67.00
Alabama	313	319	322	322	319	95.00	95.00	93.00	74.00	62.00
Mississippi	345	351	358	358	347	87.00	85.00	88.00	66.00	63.00
Arkansas	338	348	353	342	332	64.00	65.00	67.00	48.00	46.00
Louisiana	187	191	197	197	189	85.00	89.00	85.00	74.00	63.00
Oklahoma	340	330	318	302	287	52.00	58.00	59.00	47.00	43.00
Texas	1,160	1,100	1,053	990	960	71.00	71.00	71.00	54.00	47.00
South Central	3,309	3,244	3,186	3,078	2,993	73.13	74.73	76.50	60.20	54.05
Montana	10	9	9	9	8	47.00	47.00	44.00	44.00	29.00
Idaho	7	7	7	7	7	55.00	60.00	63.00	51.00	45.00
Wyoming	4	4	4	4	4	55.00	55.00	59.00	48.00	45.00
Colorado	32	31	30	28	27	56.00	58.00	57.00	52.00	42.00
New Mexico	27	25	24	23	22	45.00	50.00	49.00	39.00	39.00
Arizona	13	12	12	12	12	77.00	82.00	77.00	66.00	58.00
Utah	3	3	3	3	3	61.00	67.00	65.00	54.00	35.00
Nevada	3	3	3	3	3	61.00	62.00	55.00	47.00	44.00
Washington	24	23	22	21	20	73.00	74.00	68.00	55.00	54.00
Oregon	16	15	14	14	14	72.00	71.00	64.00	51.00	49.00
California	48	45	42	40	38	85.00	88.00	90.00	78.00	67.00
Western	187	177	170	164	158	66.49	68.98	67.11	57.21	50.39
United States	5,647	5,496	5,366	5,215	5,082	79.79	82.39	83.76	69.17	60.69

Bureau of Agricultural Economics, Estimates of crop-reporting board. Revisions by States, 1920–1927, are published in February, 1932, Crops and Markets.

[1] Sum of total value of subgroups (classified by age), divided by total number and rounded to nearest dollar for States, Division and the United States averages not rounded.
[2] Revised, January, 1932.
[3] Preliminary.

TABLE 384.—*Mules: Number in countries having 20,000 and over, average 1921–1925, annual 1926–1931*

Country	Month of estimate	Average 1921–1925 [1]	1926	1927	1928	1929	1930	1931
North America, Central America, and West Indies:		*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
United States—								
On farms	January	5,864	5,903	5,801	5,647	5,496	5,366	5,215
Not on farms		[2 3] 378						
Mexico		330	686					
Cuba	December [4]	74	72	72	73	68	92	90
Dominican Republic	April	44						
Porto Rico		20						
Haiti			23	23	23	25		
Estimated total [5]		6,800						
South America:								
Colombia		354	360	346		329		
Venezuela		55						
Peru		(130)				[2] 130		
Bolivia	December [4]	(150)	155	175				
Chile		42					[2] 31	
Argentina	December [4]	623						
Estimated total [5]		1,300						
Europe:								
Total Ireland		25	21	19	19	17	17	17
Irish Free State						17	16	16
France	December [4]	188	188	185	183	166	143	154
Spain	December-May [4]	1,129	1,286	1,295		[2] 1,154		
Portugal	October	88						
Italy	March	500	520				[2] 457	
Germany	December [4]	(6)	(6)			(6)		
Yugoslavia	January	28	15	15	15	15	15	16
Greece	December [4]	128	138	148	135	150	148	
Bulgaria	do. [4]	26						
Estimated total [5]		2,200						
Africa:								
Morocco		64	78	84	86	92	100	
Algeria	March	213	165	164	164	165	169	
Tunis	December [4]	31	33	37	38	40	41	44
Egypt	September	21	23	21	23	22	21	
Union of South Africa	April-August	131	138					
Estimated total [5]		500						
Asia and Oceania:								
Turkey, European and Asiatic		91	23	30	37			
Syria and Lebanon		20	25	20	20	22	23	
India, British	December-April	75	69	70	71	71	[2] 75	
China		[7] 5,100						
Kwantung	December [4]	16	17	19	20	22	22	23
Estimated total [5]		5,400						
Total all countries reported all periods to 1930 (14) [8]		6,747	6,747	6,655	6,494	6,246	6,232	
Estimated world total [5]		16,200						

Bureau of Agricultural Economics. Compiled from official sources and the International Institute of Agriculture. Figures in parentheses are interpolated.

1 Average for 5-year period if available. Otherwise for any year or years within this period except as otherwise stated.
2 Census.
3 1920.
4 Estimates for countries reporting as of December have been considered as of Jan. 1 of the following year; i. e., mules reporting as of Dec. 31, 1926, in France have been placed in 1927 column.
5 Includes interpolations for a few countries not reporting each year and rough estimates for some others. It is probable that mules are found in many other countries for which no estimates at all are available and for which no estimates are included in these totals.
6 Included with asses.
7 Estimate based on figures for 20 Provinces which supported 84 per cent of total in China in 1914.
8 Comparable totals for the number of countries indicated.

TABLE 385.—*Asses: Number in countries having 20,000 and over, average 1921–1925, annual 1926–1931*

Country	Month of estimate	Average, 1921–1925[1]	1926	1927	1928	1929	1930	1931
North America, Central America, and West Indies:		*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
United States, on farms	------	[2] 72	------	------	------	------	------	------
Mexico	------	[3] 521	850	------	------	------	------	------
Guatemala[4]	------	(30)	------	------	27	34	37	------
Dominican Republic	April	122	------	------	------	------	------	------
Haiti	------	(150)	170	210	240	240	------	------
Estimated total[5]	------	1,000	------	------	------	------	------	------
South America:								
Colombia	------	149	140	157	------	149	------	------
Venezuela	------	200	------	------	------	------	------	------
Peru	------	(265)	------	------	------	[2] 265	------	------
Bolivia	December[6]	(185)	189	190	------	------	------	------
Chile	------	30	------	------	------	------	[2] 37	------
Brazil	September	[2,4] 1,865	------	------	------	------	------	------
Paraguay	December[6]	20	------	------	------	------	------	------
Argentina	do.[6]	289	------	------	------	------	------	------
Estimated total[5]	------	4,400	------	------	------	------	------	------
Europe:								
Irish Free State	------	210	199	197	196	185	183	177
Ireland, total	June	224	208	206	204	194	191	191
France	December[6]	290	273	264	260	250	234	191
Spain	December–May[6]	1,067	1,077	1,138	------	[2] 1,006	------	------
Portugal	October	236	------	------	------	------	------	------
Italy	------	969	980	------	------	------	[2] 852	------
Germany	December[6]	[4] 32	[4] 30	------	------	[4] 24	[4] 21	[4] 19
Yugoslavia	January	90	96	98	104	106	------	107
Greece	December[6]	250	299	319	328	343	381	------
Bulgaria	do.[6]	122	------	------	------	------	------	------
Estimated total[5]	------	3,500	------	------	------	------	------	------
Africa:								
Morocco	------	490	565	508	497	541	576	------
Algeria	March	207	285	275	279	296	301	------
Libia (Italian)	------	40	------	------	------	------	------	------
Tunis	December[6]	138	119	154	162	159	161	180
French West Africa and French Sudan	------	334	407	430	462	602	577	------
Nigeria and British Cameroon	------	499	496	500	538	548	278	------
Egypt	September	653	739	750	762	759	763	------
Kenya colony	------	34	36	36	36	37	------	------
Anglo-Egyptian Sudan	------	296	345	348	349	350	351	------
Eritrea (Italian)	------	47	------	------	------	------	------	------
French Equatorial Africa	------	47	57	------	------	------	------	------
British Southwest Africa	------	36	45	52	58	61	61	------
Union of South Africa	April–August	780	796	------	------	------	------	------
Rhodesia, South[4]	December[6]	25	33	38	42	45	50	------
Tanganyika Territory	------	24	36	40	43	50	51	------
Estimated total[5]	------	3,700	------	------	------	------	------	------
Asia:								
Cyprus	------	45	43	42	52	54	54	------
Turkey, European and Asiatic	------	556	949	930	928	849	861	------
Syria and Lebanon	------	91	100	125	123	126	115	------
India, British	December–April	1,382	1,408	1,409	1,443	1,442	[2] 1,380	------
Native States	do	348	307	306	308	306	[2] 441	------
Kwantung	December[6]	29	28	27	27	28	29	27
Estimated total[5]	------	2,500	------	------	------	------	------	------
Total, all countries reported, all periods to 1930 (20).[7]	------	6,127	6,884	6,920	7,061	7,188	7,038	------
Estimated world total[5]	------	13,800	------	------	------	------	------	------

Bureau of Agricultural Economics. Compiled from official sources and the International Institute of Agriculture. Figures in parentheses are interpolated.

[1] Average for 5-year period if available. Otherwise, for any year or years within this period except as otherwise stated.
[2] Census.
[3] Incomplete.
[4] Asses and mules.
[5] Includes interpolations for a few countries not reporting each year and rough estimates for some others.
[6] Estimates for countries reporting as of Dec. 31, have been considered as of Jan. 1 of the following year; i. e., asses reported as of Dec. 31, 1925, in France have been placed in 1926 column, etc.
[7] Comparable totals for number of countries indicated.

DAIRY AND POULTRY STATISTICS

TABLE 386.—*Milk cows: Numbers and value per head in the United States, 1850, 1860, 1867–1931*

Year	Milk cows on farms		Year	Milk cows on farms	
	Number [1]	Value per head Jan. 1 [2]		Number [1]	Value per head Jan. 1 [2]
	Thousands	*Dollars*		*Thousands*	*Dollars*
1850 [3]	*6,385*		1900 [3]	*17,136*	
1860 [3]	*8,586*		1900	15,253	30.18
1867	8,349	28.74	1901	15,521	28.65
1868	8,692	26.56	1902	15,787	27.91
1869	9,248	29.15	1903	16,073	28.85
1870 [3]	*8,935*		1904	16,459	27.90
1870	10,096	32.70	1905	16,842	26.21
1871	10,023	33.89	1906	17,277	28.12
1872	10,304	29.45	1907	17,650	29.60
1873	10,576	26.72	1908	17,937	29.29
1874	10,705	25.63	1909	18,154	30.90
1875	10,907	25.74	1910 [3]	*20,625*	
1876	11,085	25.61	1910	18,206	33.70
1877	11,261	25.47	1911	18,244	38.17
1878	11,300	25.74	1912	18,312	37.62
1879	11,826	21.71	1913	18,526	42.99
1880 [3]	*12,443*		1914	18,930	51.51
1880	12,027	23.27	1915	19,526	52.84
1881	12,369	23.95	1916	20,064	51.49
1882	12,612	25.89	1917	20,541	56.95
1883	13,126	30.21	1918	21,021	67.37
1884	13,501	31.37	1919	21,219	74.68
1885	13,905	29.70	1920 [3]	*19,675*	
1886	14,235	27.40	1920	21,455	81.51
1887	14,522	26.08	1921	21,440	61.20
1888	14,856	24.65	1922	21,822	48.69
1889	15,299	23.94	1923	22,099	48.68
1890 [3]	*16,512*		1924	22,288	49.94
1890	15,953	22.14	1925 [3]	*20,900*	
1891	16,020	21.62	1925	22,505	48.38
1892	16,416	21.40	1926	22,311	54.73
1893	16,424	21.75	1927	22,159	59.24
1894	16,487	21.77	1928	22,129	73.47
1895	16,505	21.97	1929	22,330	83.99
1896	16,138	22.55	1930 [3]	*20,496*	
1897	15,942	23.16	1930	22,910	82.80
1898	15,841	27.45	1931	23,558	57.11
1899	15,990	29.66	1932 [4]	24,379	39.61

Bureau of Agricultural Economics. Estimates of the crop reporting board.

[1] Prior to 1900, estimates for each 10-year period represent an index of annual changes applied to the census as a base on first report after census data were available. Figures for 1900 to 1919 are tentatively revised estimates of the Bureau of Agricultural Economics for numbers on Jan. 1. Figures from 1920 to 1931 are revised estimates made in 1932, based upon study of 1930 census report. Figures 1900 to 1932 relate to "cows and heifers 2 years old and over Jan. 1, kept for milk."

[2] Values for 1867–1899 relate to "milk cows." Data for 1900–1925 are an old series of values of "milk cows" adjusted to relate to "milk cows and heifers, 2 years old and over" on basis of relationship between the 2 series from 1926 to 1928. Conversion factor was 0.955 (base is old series). Data for 1926–1932 are values' relating to "milk cows and heifers 2 years old and over."

[3] Italic figures are from the census. Figures for census years 1850–1890 represent "milk cows"; 1900, "cows kept for milk 2 years and over"; 1910 "cows and heifers kept for milk, born before Jan. 1, 1909" (15½ months and over); 1920 "dairy cattle 2 years old and over kept mainly for milk production"; 1925 and 1930, "number of cows milked in 1924 and 1929." Census dates were June 1 from 1850 to 1900; Apr. 15, 1910; Jan. 1, 1920 and 1925; Apr. 1, 1930.

[4] Preliminary.

TABLE 387.—*Milk cows and heifers: Estimated number on farms and value per head, by States, January 1, 1928–1932*

State and division	Cows and heifers, 2 years old and over, kept for milk									
	Number					Value per head				
	1928	1929	1930	1931	1932 [1]	1928	1929	1930	1931	1932 [1]
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Maine	138	135	136	140	143	76.00	87.00	96.00	70.00	50.00
New Hampshire	75	74	75	79	81	100.00	113.00	118.00	90.00	61.00
Vermont	279	276	277	288	299	97.00	100.00	101.00	79.00	52.00
Massachusetts	136	132	132	131	131	125.00	130.00	140.00	122.00	88.00
Rhode Island	20	20	21	21	21	132.00	142.00	150.00	123.00	90.00
Connecticut	101	101	103	108	113	130.00	140.00	141.00	110.00	83.00
New York	1,306	1,306	1,330	1,370	1,411	111.00	124.00	120.00	86.00	61.00
New Jersey	117	117	118	119	120	120.00	135.00	155.00	125.00	89.00
Pennsylvania	820	810	835	860	886	97.00	111.00	112.00	80.00	60.00
North Atlantic	2,992	2,971	3,027	3,116	3,205	105.74	117.64	118.09	87.16	62.51
Ohio	875	867	900	910	938	83.00	93.00	93.00	59.00	44.00
Indiana	686	693	702	722	751	75.00	85.00	84.00	53.00	39.00
Illinois	987	977	1,026	1,057	1,099	76.00	89.00	89.00	64.00	42.00
Michigan	775	785	800	825	850	87.00	99.00	99.00	62.00	45.00
Wisconsin	1,940	1,925	2,015	2,096	2,150	86.00	97.00	97.00	64.00	43.00
North Central, East	5,263	5,247	5,443	5,610	5,788	82.34	93.56	93.45	61.48	42.75
Minnesota	1,525	1,539	1,595	1,643	1,708	72.00	85.00	82.00	56.00	35.00
Iowa	1,368	1,384	1,400	1,414	1,456	76.00	86.00	85.00	59.00	38.00
Missouri	826	877	930	989	1,030	61.00	74.00	70.00	44.00	30.00
North Dakota	504	516	540	567	589	61.00	75.00	73.00	50.00	33.00
South Dakota	557	560	577	589	607	68.00	77.00	78.00	52.00	31.00
Nebraska	676	676	680	680	700	71.00	84.00	79.00	56.00	36.00
Kansas	760	760	780	811	860	62.00	75.00	74.00	48.00	33.00
North Central, West	6,216	6,312	6,502	6,693	6,950	68.84	80.85	78.55	53.03	34.22
North Central	11,479	11,559	11,945	12,303	12,738	75.03	86.62	85.34	56.88	38.10
Delaware	34	33	33	33	35	92.00	110.00	112.00	80.00	54.00
Maryland	177	178	180	184	186	85.00	97.00	100.00	75.00	49.00
Virginia	360	367	375	383	390	58.00	70.00	72.00	43.00	35.00
West Virginia	202	204	210	214	225	65.00	75.00	76.00	47.00	37.00
North Carolina	294	285	285	299	306	59.00	64.00	64.00	48.00	37.00
South Carolina	149	145	140	140	141	47.00	55.00	54.00	46.00	33.00
Georgia	322	315	320	329	336	42.00	49.00	49.00	36.00	25.00
Florida	85	85	86	86	88	37.00	46.00	55.00	47.00	38.00
South Atlantic	1,623	1,612	1,629	1,668	1,707	57.43	66.65	68.06	47.75	35.56
Kentucky	496	512	498	498	518	60.00	65.00	64.00	40.00	30.00
Tennessee	450	461	468	487	507	53.00	60.00	60.00	39.00	28.00
Alabama	348	353	360	371	390	40.00	46.00	48.00	33.00	23.00
Mississippi	405	415	430	447	469	40.00	45.00	47.00	30.00	21.00
Arkansas	364	370	372	383	421	42.00	48.00	48.00	27.00	23.00
Louisiana	231	238	240	247	260	36.00	49.00	47.00	36.00	30.00
Oklahoma	623	631	650	682	716	56.00	64.00	59.00	36.00	27.00
Texas	1,105	1,160	1,202	1,238	1,288	57.00	61.00	56.00	36.00	29.00
South Central	4,022	4,140	4,220	4,353	4,569	51.02	57.11	55.03	35.13	26.86
Montana	183	190	193	193	195	63.00	79.00	77.00	55.00	36.00
Idaho	170	173	178	187	194	75.00	86.00	80.00	65.00	39.00
Wyoming	70	71	72	72	72	70.00	86.00	84.00	65.00	39.00
Colorado	257	258	259	260	266	69.00	77.00	72.00	56.00	36.00
New Mexico	67	68	69	69	70	57.00	67.00	65.00	50.00	37.00
Arizona	35	37	38	40	42	85.00	95.00	95.00	78.00	57.00
Utah	100	104	108	111	113	73.00	87.00	82.00	62.00	36.00
Nevada	20	20	21	21	21	85.00	98.00	90.00	70.00	51.00
Washington	270	270	280	288	300	80.00	99.00	92.00	68.00	53.00
Oregon	216	220	229	240	250	72.00	88.00	80.00	61.00	45.00
California	625	637	642	637	637	80.00	94.00	94.00	79.00	51.00
Western	2,013	2,048	2,089	2,118	2,160	74.45	88.33	84.76	66.80	44.78
United States	22,129	22,330	22,910	23,558	24,379	73.47	83.99	82.80	57.11	39.61

Bureau of Agricultural Economics. Estimates of crop reporting board. Revisions by States, 1920–1927, are published in February, 1932, Crops and Markets.

[1] Preliminary.

TABLE 388.—*Heifers and heifer calves: Estimated number on farms, by States, January 1, 1928–1932*

State and division	Heifers 1 to 2 years old being kept for milk cows					Heifer calves under 1 year being kept for milk cows				
	1928	1929	1930	1931	1932 [1]	1928	1929	1930	1931	1932 [1]
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
Maine	33	33	36	40	38	34	37	40	41	41
New Hampshire	15	16	17	18	18	17	18	18	19	20
Vermont	49	55	58	59	58	56	59	60	59	57
Massachusetts	17	18	21	20	18	18	21	20	20	20
Rhode Island	3	3	3	3	3	3	4	4	4	4
Connecticut	15	16	18	19	17	16	18	19	19	18
New York	197	224	245	237	213	232	250	242	218	215
New Jersey	15	15	16	17	16	15	17	18	16	19
Pennsylvania	131	147	174	165	155	152	180	187	160	158
North Atlantic	475	527	588	578	536	543	604	608	556	552
Ohio	145	170	187	189	182	175	193	194	188	180
Indiana	120	135	141	149	140	139	145	154	145	144
Illinois	183	195	218	234	215	200	225	240	215	225
Michigan	143	151	166	169	160	156	171	175	165	163
Wisconsin	364	368	385	402	399	380	397	415	412	409
North Central, East	955	1,019	1,097	1,143	1,096	1,050	1,131	1,178	1,125	1,121
Minnesota	283	313	339	341	335	345	375	355	340	355
Iowa	290	300	310	300	285	309	319	310	295	285
Missouri	166	176	200	209	198	182	206	216	205	200
North Dakota	89	100	123	120	115	103	127	125	122	120
South Dakota	120	127	135	138	138	131	139	150	154	154
Nebraska	138	138	138	131	126	142	142	140	130	127
Kansas	130	137	155	143	150	141	160	165	155	165
North Central, West	1,216	1,291	1,400	1,382	1,347	1,353	1,468	1,461	1,401	1,406
North Central	2,171	2,310	2,497	2,525	2,443	2,403	2,599	2,639	2,526	2,527
Delaware	5	5	6	6	5	5	6	6	5	4
Maryland	27	29	30	32	28	29	30	31	28	26
Virginia	44	49	51	56	54	58	62	66	56	53
West Virginia	26	29	32	31	29	30	34	34	34	34
North Carolina	50	57	58	64	66	59	62	68	70	70
South Carolina	29	27	28	30	29	28	29	30	29	30
Georgia	71	69	73	80	83	71	75	84	82	84
Florida	16	15	14	14	15	16	15	14	15	16
South Atlantic	268	280	292	313	309	296	313	333	319	317
Kentucky	78	80	84	79	71	82	86	81	77	75
Tennessee	95	98	100	98	93	101	103	102	98	95
Alabama	92	94	98	100	104	97	100	105	108	114
Mississippi	66	70	78	81	84	68	75	83	85	87
Arkansas	86	88	84	92	97	92	87	96	106	105
Louisiana	46	51	49	51	54	53	51	53	56	58
Oklahoma	127	128	132	138	145	162	164	165	174	182
Texas	202	209	220	228	235	214	228	250	259	265
South Central	792	818	845	867	883	869	894	935	963	981
Montana	35	37	37	39	39	39	40	40	44	44
Idaho	38	39	43	50	53	40	41	50	53	54
Wyoming	15	15	15	15	15	16	16	16	16	17
Colorado	56	57	57	57	59	65	66	66	68	70
New Mexico	13	14	15	15	15	16	16	17	17	17
Arizona	9	9	9	10	11	10	10	10	11	12
Utah	24	26	25	28	29	27	26	26	29	30
Nevada	8	7	6	6	6	8	7	7	7	7
Washington	57	61	62	65	65	64	65	65	70	70
Oregon	47	49	52	55	57	50	54	53	58	58
California	150	155	157	154	145	160	160	140	145	135
Western	452	469	478	494	494	495	501	490	518	514
United States	4,158	4,404	4,700	4,777	4,665	4,606	4,911	5,005	4,882	4,891

Bureau of Agricultural Economics. Estimates of crop-reporting board. Revisions by States, 1920–1927, are published in February, 1932, Crops and Markets

[1] Preliminary.

TABLE 389.—*Heifers and heifer calves: Estimated number on farms, United States, January 1, 1920–1932*

Year	Heifers 1 to 2 years old being kept for milk cows	Heifer calves under 1 year being kept for milk cows	Year	Heifers 1 to 2 years old being kept for milk cows	Heifer calves under 1 year being kept for milk cows
	Thousands	*Thousands*		*Thousands*	*Thousands*
1920	4,420		1927	4,048	4,383
1921	4,164		1928	4,158	4,606
1922	3,972		1929	4,404	4,911
1923	4,155		1930	4,700	5,005
1924	4,143	4,426	1931	4,777	4,882
1925	4,171	4,274	1932 [1]	4,665	4,891
1926	4,045	4,276			

Bureau of Agricultural Economics.

[1] Preliminary.

TABLE 390.—*Purebred dairy cattle: Number registered, each year, by breeds, United States, 1921–1931*

Year	Ayrshire			Guernsey			Holstein-Friesian			Jersey		
	Bulls	Cows	Total	Bulls	Cows	Total	Bulls	Cows	Total	Bulls	Cows	Total
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
1921			5,874	8,036	13,971	22,007	39,585	88,265	127,850	11,213	31,123	42,336
1922	1,565	4,816	6,381	8,065	14,007	22,072	30,631	83,141	113,772	11,651	33,801	45,452
1923	1,578	5,975	7,553	9,758	16,976	26,734	29,089	86,043	115,132	12,291	38,159	50,450
1924	1,431	5,508	6,939	10,301	18,166	28,467	28,209	83,320	111,529	12,331	39,832	52,163
1925	1,561	5,972	7,533	11,299	20,742	32,041	26,935	82,659	109,594	12,131	41,725	53,856
1926	1,720	6,142	7,862	12,392	22,298	34,690	28,117	82,971	111,088	12,837	42,915	55,752
1927	1,847	6,554	8,401	12,777	22,694	35,471	28,817	81,146	109,963	15,666	48,411	64,077
1928	2,274	7,837	10,111	14,363	24,664	39,027	33,512	88,214	121,726	19,393	54,516	73,909
1929	2,586	8,833	11,419	14,661	26,288	40,949	35,438	89,927	125,365	19,230	52,431	71,661
1930	2,050	8,159	10,209	15,810	28,662	44,472	29,242	75,901	105,143	14,350	43,767	58,117
1931	1,552	7,324	8,876	12,880	27,964	40,844	21,811	70,535	92,346	10,262	38,211	48,473

Bureau of Agricultural Economics. Obtained from registry associations. See 1930 Yearbook, Table 441, p. 901, for data for earlier years.

TABLE 391.—*Cattle: Tuberculin testing under accredited-herd and area plans, 1920–21 to 1930–31*

Year beginning July—	Cattle tested					Modified accredited counties	Herds accredited [1]	Herds passed 1 test [1]	Herds under supervision [1]
	Accredited-herd plan	Area plan	Total	Reactors found	Percentage of reactors				
	Number	*Number*	*Number*	*Number*	*Per cent*	*Number*	*Number*	*Number*	*Number*
1920–21	1,366,358		1,366,358	53,768	3.9		4,831	33,215	71,806
1921–22	1,722,209	[2] 662,027	2,384,236	82,569	3.5		8,015	111,719	140,376
1922–23	1,695,662	1,765,187	3,460,849	113,844	3.3		12,310	150,748	187,915
1923–24	1,865,863	3,446,501	5,312,364	171,559	3.2	38	19,747	216,737	305,809
1924–25	2,008,526	4,991,502	7,000,028	214,491	3.1	51	24,110	392,740	414,620
1925–26	1,989,048	6,661,732	8,650,780	323,084	3.7	109	24,009	382,674	435,840
1926–27	2,522,791	7,177,385	9,700,176	285,361	2.9	149	34,084	229,086	261,148
1927–28	2,589,844	8,691,646	11,281,490	262,113	2.3	180	38,880	427,595	473,218
1928–29	2,853,633	8,830,087	11,683,720	206,764	1.8	213	1,639	249,420	281,323
1929–30	2,953,350	9,892,521	12,845,871	216,932	1.7	236	11,863	227,921	347,448
1930–31	3,086,403	10,695,870	13,782,273	203,778	1.5	247	[3] 26,259	350,735	356,916

Bureau of Animal Industry.

[1] The figures in these columns represent net increases at the close of each year.
[2] Testing during 6 months.
[3] Represents net decrease during the year.

TABLE 392.—*Milk: Annual production of milk per milk cow in herds kept by crop correspondents, by States, 1925–1931* [1]

State and division	1925	1926	1927	1928	1929	1930	1931
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Maine	5, 274	5, 268	5, 262	5, 069	5, 232	5, 381	5, 055
New Hampshire	5, 232	5, 861	5, 718	5, 704	5, 761	5, 673	5, 472
Vermont	5, 223	5, 180	5, 350	5, 200	5, 171	5, 259	5, 283
Massachusetts	6, 190	6, 713	6, 701	6, 536	6, 251	6, 603	6, 348
Rhode Island	6, 248	6, 622	6, 734	7, 006	6, 807	7, 166	6, 975
Connecticut	5, 934	6, 391	6, 549	6, 240	6, 178	6, 369	6, 226
New York	5, 943	6, 159	6, 296	6, 323	6, 220	6, 193	6, 305
New Jersey	6, 655	6, 460	6, 768	7, 085	7, 163	6, 962	7, 136
Pennsylvania	5, 834	6, 135	6, 260	6, 268	6, 287	6, 251	6, 238
North Atlantic	5, 840	6, 061	6, 185	6, 176	6, 133	6, 138	6, 150
Ohio	5, 469	5, 670	5, 883	5, 856	5, 907	5, 767	5, 834
Indiana	5, 083	5, 207	5, 423	5, 356	5, 542	5, 311	5, 381
Illinois	4, 937	5, 143	5, 070	5, 252	5, 320	5, 344	5, 207
Michigan	6, 035	6, 342	6, 363	6, 442	6, 464	6, 299	6, 342
Wisconsin	5, 928	6, 108	6, 172	6, 262	6, 381	6, 196	6, 077
North Central, East	5, 578	5, 783	5, 861	5, 933	6, 025	5, 882	5, 829
Minnesota	5, 524	5, 539	5, 673	5, 835	5, 977	5, 898	5, 770
Iowa	4, 438	4, 681	4, 778	5, 124	5, 280	5, 283	5, 165
Missouri	3, 398	3, 589	3, 729	3, 852	3, 854	3, 817	3, 784
North Dakota	4, 310	4, 474	4, 544	4, 904	4, 885	4, 897	4, 882
South Dakota	3, 918	4, 070	4, 468	4, 606	4, 754	4, 788	4, 730
Nebraska	4, 225	4, 693	4, 855	4, 907	4, 870	5, 119	5, 168
Kansas	4, 292	4, 721	4, 870	4, 938	5, 034	5, 016	5, 070
North Central, West	4, 481	4, 690	4, 835	5, 030	5, 115	5, 110	5, 046
North Central	5, 010	5, 218	5, 331	5, 465	5, 554	5, 485	5, 408
Delaware	4, 788	5, 019	5, 289	5, 078	5, 213	4, 940	5, 186
Maryland	5, 244	5, 505	5, 797	5, 792	5, 591	5, 302	5, 420
Virginia	4, 109	4, 337	4, 739	4, 612	4, 541	4, 015	4, 228
West Virginia	3, 863	4, 298	4, 651	4, 673	4, 462	4, 252	4, 337
North Carolina	4, 048	4, 420	4, 529	4, 444	4, 389	4, 188	4, 191
South Carolina	3, 245	3, 504	3, 705	3, 773	3, 595	3, 635	3, 702
Georgia	3, 169	3, 340	3, 659	3, 508	3, 419	3, 331	3, 203
Florida	2, 628	2, 509	2, 458	2, 541	2, 698	2, 497	2, 601
South Atlantic	3, 881	4, 142	4, 415	4, 345	4, 253	4, 007	4, 063
Kentucky	4, 413	4, 654	4, 782	4, 541	4, 480	4, 204	4, 149
Tennessee	3, 446	4, 015	4, 103	4, 124	4, 048	3, 851	3, 732
Alabama	2, 817	3, 005	3, 075	2, 986	3, 069	3, 045	2, 896
Mississippi	2, 558	2, 835	2, 987	3, 026	3, 011	2, 996	2, 935
Arkansas	3, 154	3, 410	3, 626	3, 483	3, 474	3, 239	3, 242
Louisiana	2, 324	2, 403	2, 582	2, 489	2, 652	2, 509	2, 470
Oklahoma	3, 705	4, 170	4, 267	4, 130	4, 167	3, 939	3, 951
Texas	2, 798	3, 303	3, 626	3, 553	3, 604	3, 440	3, 443
South Central	3, 221	3, 598	3, 777	3, 689	3, 703	3, 529	3, 478
Montana	4, 009	4, 386	4, 657	4, 737	5, 150	5, 183	4, 687
Idaho	5, 661	5, 776	5, 953	6, 149	6, 360	6, 713	6, 394
Wyoming	3, 872	4, 380	4, 508	4, 657	4, 991	4, 696	4, 602
Colorado	4, 371	4, 648	5, 101	5, 039	5, 286	5, 223	4, 931
New Mexico	3, 075	3, 556	4, 158	3, 822	3, 674	3, 677	4, 027
Arizona	5, 143	5, 898	6, 059	5, 697	5, 819	5, 928	5, 627
Utah	5, 107	5, 451	5, 466	5, 792	6, 050	5, 867	5, 761
Nevada	4, 781	4, 879	4, 924	4, 923	5, 551	5, 521	5, 168
Washington	6, 083	6, 275	6, 670	6, 512	6, 506	6, 585	6, 400
Oregon	5, 356	5, 928	5, 937	6, 100	5, 950	6, 019	5, 877
California	6, 108	5, 636	6, 019	6, 088	6, 369	6, 479	6, 591
Western	5, 317	5, 404	5, 706	5, 748	5, 936	6, 002	5, 873
United States	4, 785	5, 015	5, 164	5, 214	5, 265	5, 188	5, 114

Bureau of Agricultural Economics.

[1] State averages are calculated by multiplying average daily production per cow by the number of days in the year. Daily production derived from milk production and milk cows reported on the 1st of each month for about 20,000 herds. Averages for United States and divisions are weighted by States. Weights are not yet adjusted to revised estimates of numbers of milk cows.

TABLE 393.—*Milk cows: Estimated average price*[1] *per head received by producers, United States, 1922–1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Average
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1922	52.83	53.54	54.87	54.46	54.76	54.87	54.20	52.67	52.79	52.86	51.62	53.21	53.56
1923	54.01	54.15	55.29	56.14	55.91	56.34	56.22	55.45	56.13	55.51	55.39	54.66	55.43
1924	55.57	55.49	55.88	55.92	56.37	56.45	55.46	55.74	55.54	54.30	55.05	54.00	55.48
1925	54.81	54.79	56.19	56.85	57.88	57.79	57.95	58.26	58.68	60.17	60.69	60.38	57.87
1926	62.06	63.41	63.17	65.65	66.63	66.74	66.68	65.37	66.12	66.26	66.91	66.74	65.51
1927	66.77	68.22	70.18	71.98	72.43	74.19	74.15	74.24	76.10	78.62	81.09	82.36	74.19
1928	83.11	86.34	87.95	88.55	89.00	89.90	90.37	90.43	92.56	92.86	93.05	92.87	89.75
1929	91.54	91.77	92.80	93.55	94.94	95.29	96.34	95.26	95.55	95.12	94.48	92.61	94.10
1930	89.17	85.02	81.00	80.70	79.53	77.62	71.75	65.91	66.23	66.37	64.68	62.00	74.16
1931	59.90	56.88	56.34	56.53	54.45	51.50	49.47	47.85	46.68	45.58	45.99	44.17	51.28

Bureau of Agricultural Economics. Monthly prices by States, weighted by number of milk cows Jan. 1, to obtain a price for the United States; yearly price is a simple average of 12 months. For previous data see 1930 or earlier Yearbooks.

[1] As reported by country dealers.

TABLE 394.—*Average production, cost, and value per cow of butterfat and milk, classified on butterfat basis, 12 months records completed in 1930 by dairy-herd-improvement associations*

Cows	Milk	Butterfat	Price of product per pound	Value of product	Cost of roughage	Cost of grain	Total feed cost	Value of product over feed cost	Return for $1 spent for feed	Feed cost per pound of butterfat	Feed cost per 100 pounds of milk
Number	*Pounds*	*Pounds*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
157	221	10	0.78	8	24	12	36	[1] −28	0.22	3.60	16.29
611	1,331	54	.68	37	27	16	43	[1] −6	.86	.80	3.23
2,356	2,666	106	.65	69	31	20	51	18	1.35	.48	1.91
9,838	3,942	155	.63	97	33	24	57	40	1.70	.37	1.45
27,936	5,219	203	.62	125	35	28	63	62	1.98	.31	1.21
49,218	6,425	251	.62	155	37	35	72	83	2.15	.29	1.12
56,787	7,601	299	.61	184	39	39	78	106	2.36	.26	1.03
44,075	8,732	348	.61	214	40	44	84	130	2.55	.24	.96
25,618	9,886	397	.61	244	41	48	89	155	2.74	.22	.90
11,790	10,977	446	.62	275	43	56	99	176	2.78	.22	.90
4,530	12,200	496	.63	311	45	63	108	203	2.88	.22	.89
1,723	13,369	545	.64	348	47	71	118	230	2.95	.22	.88
616	14,684	596	.65	386	51	80	130	256	2.97	.22	.89
224	16,203	648	.68	440	56	91	147	293	2.99	.23	.91
75	17,469	695	.62	430	53	94	147	283	2.93	.21	.84
34	18,523	744	.65	485	53	103	156	329	3.11	.21	.84
22	19,752	800	.69	552	63	121	184	368	3.00	.23	.93
6	18,432	849	.53	448	53	115	168	280	2.67	.20	.91
7	23,229	894	.69	615	77	151	228	387	2.70	.26	.98
1	27,765	972	.60	583	43	98	141	442	4.13	.15	.51
Average	7,642	303	.62	187	39	40	79	108	2.37	.26	1.03

Bureau of Dairy Industry.

[1] Minus (—) sign indicates loss.

TABLE 395.—*Dairy products: Quantity produced, 1923–1930*

Product	1923	1924	1925	1926	1927	1928	1929	1930
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Creamery butter	1,252,214	1,356,080	1,361,526	1,451,766	1,496,495	1,487,049	1,597,027	1,595,231
Whey butter (made from whey cream)	1,904	1,665	1,774	2,872	1,217	1,097	1,221	2,516
Renovated or process butter	2,802	2,813	2,519	2,505	4,286	2,716	2,531	1,850
American cheese:								
Whole milk	308,108	324,695	347,240	335,915	307,777	335,253	370,314	378,816
Part skim	2,145	2,470	2,793	2,927	3,390	2,900	4,951	3,653
Full skim	2,033	1,605	3,298	1,384	1,888	3,048	1,074	669
Swiss cheese (including block)	24,555	21,844	23,457	20,883	18,141	16,718	19,406	26,393
Brick and Munster cheese	33,250	32,052	34,101	31,048	31,546	28,960	31,763	33,548
Limburger cheese	7,100	9,734	9,163	9,639	8,842	7,437	8,568	8,473
Cream and Neufchatel cheese	10,334	14,945	17,575	18,192	25,962	30,589	34,405	33,213
All Italian varieties of cheese	2,132	1,973	1,562	2,425	3,377	3,587	5,948	8,573
All other varieties of cheese	5,040	4,622	4,325	5,003	5,763	9,027	7,504	7,029
Cottage, pot, and bakers' cheese	35,527	54,347	59,485	67,977	75,679	87,525	94,941	97,641
Condensed milk (sweetened):								
Case goods—								
Skimmed	2,748	2,044	3,135	1,298	1,623	1,366	1,632	2,092
Unskimmed	196,058	187,281	186,807	154,944	161,355	139,077	145,922	121,626
Bulk goods—								
Skimmed	102,236	96,581	114,198	147,473	143,722	154,723	202,475	158,971
Unskimmed	44,860	47,429	44,758	55,737	39,668	38,660	51,689	62,421
Total condensed milk	345,902	333,335	348,898	359,452	346,368	333,826	401,718	345,110
Evaporated milk (unsweetened):								
Case goods—								
Skimmed	7,035	11,555	5,994	11,985	8,100	10,618	---------	1,650
Unskimmed	1,252,520	1,189,755	1,202,456	1,158,476	1,273,815	1,337,022	1,499,644	1,449,149
Bulk goods—								
Skimmed	77,416	83,131	86,954	116,758	126,085	147,625	153,624	156,212
Unskimmed	92,008	82,772	113,556	86,833	101,354	89,336	151,662	128,203
Total evaporated milk	1,428,979	1,367,213	1,408,960	1,374,052	1,509,354	1,584,601	1,804,930	1,735,214
Condensed or evaporated buttermilk	54,833	66,837	77,079	86,687	99,180	102,452	107,288	96,431
Dried or powdered buttermilk	13,032	18,058	20,246	31,378	38,435	45,502	54,215	64,601
Powdered whole milk	6,560	7,887	8,931	10,768	11,464	9,605	13,202	15,440
Powdered skimmed milk	62,251	69,219	73,317	91,718	118,123	147,990	207,579	260,675
Powdered cream	328	1,018	339	331	338	673	294	400
Dried casein (skim milk or buttermilk product)	14,548	20,759	16,660	16,953	18,033	22,151	30,537	41,965
Malted milk	15,331	15,889	18,050	20,673	22,116	21,128	22,850	22,691
Milk sugar (crude)	2,872	3,331	5,655	4,476	4,077	5,323	8,965	12,779
Ice cream of all kinds (gallons)	173,412	181,564	214,382	215,248	226,756	232,185	254,618	240,750

Bureau of Agricultural Economics. Compiled from reports of factories made direct to the bureau. The 1929 and 1930 statistics are the most complete since these reports were inaugurated in 1918. Some allowance, therefore, should be made for this when comparing 1929 and 1930 production with that of previous years.

TABLE 396.—*Dairy products: Quantity produced, 1930, by months*

Manufactured product	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
Creamery butter	108,382	102,252	115,679	133,271	184,385	189,788	167,559	137,420	122,580	120,247	101,974	111,694	1,595,231
Whey butter (made from whey cream)	109	115	142	171	309	349	353	295	243	185	135	110	2,516
Renovated or process butter	152	106	147	158	135	143	181	247	210	120	137	114	1,850
American cheese:													
Whole milk	23,666	23,031	28,502	34,143	48,545	53,887	45,582	33,555	26,705	23,581	18,781	18,838	378,816
Part skim	320	277	335	337	380	383	348	326	294	200	222	231	3,653
Full skim	28	17	29	68	97	106	150	88	38	32	12	4	669
Swiss cheese (including block)	272	315	519	1,385	3,700	4,336	4,154	3,548	2,979	2,569	1,666	950	26,393
Brick and Munster cheese	2,531	2,368	2,914	3,152	3,546	3,492	2,861	2,367	2,333	2,668	2,625	2,691	33,548
Limburger cheese	399	389	584	739	1,090	1,155	1,013	791	679	695	518	421	8,473
Cream and Neufchatel cheese	3,228	2,797	3,559	2,821	2,744	2,857	2,442	2,424	2,369	2,636	2,615	2,722	33,213
All Italian varieties	603	579	748	858	939	862	839	756	695	576	567	551	8,573
All other varieties	620	562	676	527	612	643	623	649	659	522	458	478	7,029
Cottage, Pot, and Baker's cheese	7,523	7,645	9,100	8,972	9,567	9,231	8,351	7,859	7,313	7,655	7,186	7,239	97,641
Condensed milk (sweetened):													
Case goods—													
Skimmed	209	182	131	207	246	248	112	152	163	178	176	88	2,092
Unskimmed	12,195	11,007	12,816	17,268	10,329	10,051	9,231	7,046	5,801	9,164	7,960	8,758	121,626
Bulk goods—													
Skimmed	11,263	10,312	13,177	14,786	20,180	18,975	14,298	11,586	9,977	13,263	10,517	10,637	158,971
Unskimmed	4,744	4,509	4,270	4,533	8,683	8,552	5,264	5,311	4,557	4,646	3,524	3,828	62,421
Evaporated milk (unsweetened):													
Case goods—													
Skimmed	251	238	325	213	246	116	47	39	24	51	57	43	1,650
Unskimmed	93,836	92,429	113,277	134,188	174,906	183,592	153,949	117,440	97,249	100,330	89,790	98,163	1,449,149
Bulk goods—													
Skimmed	8,925	9,773	11,614	14,070	18,114	18,738	16,172	13,694	10,880	13,263	10,744	10,225	156,212
Unskimmed	7,946	7,997	9,799	10,183	14,941	15,413	14,202	12,182	9,603	9,808	8,267	7,862	128,203
Concentrated skim milk (for animal feed)	1,861	1,716	1,449	1,723	1,765	1,416	3,054	2,145	1,809	2,009	2,028	2,177	23,152
Condensed or evaporated buttermilk	6,695	6,218	6,175	8,526	11,933	11,442	8,597	6,980	6,779	8,642	7,325	7,119	96,431
Dried or powdered buttermilk	4,282	4,401	5,126	5,951	7,523	7,353	6,878	5,642	4,759	4,308	3,852	4,526	64,601
Powdered whole milk	577	621	1,040	1,616	2,636	3,083	1,883	825	616	984	765	794	15,440
Powdered skim milk	17,137	16,131	19,981	22,208	29,050	30,013	26,013	21,503	18,551	19,844	19,408	20,836	260,675
Powdered cream	----	----	25	26	80	126	29	23	25	66	----	----	400
Dried casein	2,962	2,889	3,545	4,165	5,018	5,195	4,024	3,274	2,793	2,847	2,409	2,844	41,965
Malted milk	2,113	2,025	2,429	2,044	2,148	1,905	1,721	1,768	1,659	1,827	1,538	1,514	22,691
Milk sugar (crude)	927	835	1,029	1,200	1,287	1,371	1,193	877	891	1,035	1,005	1,129	12,779
Ice cream (all kinds), gallons	9,977	11,992	14,678	19,421	28,017	33,465	38,070	30,991	22,316	13,043	10,167	8,613	240,750

Bureau of Agricultural Economics. Compiled from reports made direct to the bureau.

TABLE 397.—*Fluid milk and cream: Receipts*[1] *at New York, Philadelphia, Boston, and Chicago, by State of origin—1930 and 1931*

(40-quart units)[2]

State or origin	New York		Philadelphia		Boston		Chicago
	1930	1931	1930	1931	1930	1931	1931
Fluid milk:							
Connecticut	206,080	226,755			40,051	5,965	
Delaware	5,916	20,745	558,870	509,171			
Indiana		521					
Maine	190				466,858	653,069	
Maryland	129,572	130,314	883,395	897,193			
Massachusetts	100,046	142,939			656,230	628,173	
New Hampshire					786,959	778,265	
New Jersey	1,098,490	820,525	497,308	531,023			
New York	26,656,903	24,316,614	9,587	3,019	593,355	515,957	
Ohio	1,356	12,517	6,290	1,110			
Pennsylvania	4,880,032	5,195,697	5,298,624	5,194,375			
Rhode Island					291		
Vermont	1,233,618	1,293,051			3,633,198	3,834,583	
Virginia			41,104	37,120			
West Virginia			99,829	69,976			
Wisconsin	200		310	691			
Canada	15,874	5,170					
Total	34,328,277	32,164,848	7,395,317	7,243,678	6,176,942	6,416,012	
Fluid cream:							
Alabama						4,859	
Arkansas	616		2,421	406		899	1,714
Connecticut	7,182	6,152			145		
Delaware	65	826	4,371	6,035			
Illinois	1,016	600	2,754	2,000	200	1,400	259,300
Indiana	7,855	14,130	73,237	97,298	7,300	12,897	16,606
Iowa	192		400				5,299
Kansas			1,268		1,400	2,495	389
Kentucky	1,400		4,822	1,200		6,210	8,875
Maine	2				101,910	75,005	
Maryland	3,300	886	39,214	25,403		200	
Massachusetts	6,441	2,215			1,976	1,678	
Michigan	1,830	250	17,292	6,500	8,392	20,079	43,094
Minnesota	6,316	5,483	19,334	3,018	7,291	7,335	80
Mississippi	217		200				5
Missouri	4,415	850	15,367	7,888	8,003	19,783	26,102
New Hampshire					29,830	21,918	
New Jersey	16,212	18,275	589	1,991	200		
New York	1,350,342	1,517,191	3,083	21,004	35,844	58,684	
North Dakota							1
Ohio	21,994	17,969	29,260	23,894	11,690	17,220	8,062
Oklahoma			1,450				130
Pennsylvania	251,630	225,457	46,292	41,719		500	
Rhode Island					5		
Tennessee	13,135	6,704	4,756	2,155	600	13,523	3
Texas	200		1,748	1,145			1
Vermont	95,844	76,630			321,657	266,386	
Virginia			31,172	9,837			1
West Virginia			1,989	6,695			
Wisconsin	18,049	3,645	92,010	75,687	14,120	57,039	527,334
Canada	34,152	1,339			31,883		
Total	1,842,405	1,898,602	393,029	333,875	582,446	588,110	896,996

Bureau of Agricultural Economies.

[1] Figures include both rail and truck receipts at Philadelphia and Boston, but rail receipts only at New York and Chicago. Receipts by truck at New York in 1931 were: Milk, 3,370,129 cans; cream, 14,793 cans. In 1930, milk, 2,141,514 cans; cream, 4,601 cans.

[2] 40-quart units equal 10 gallons, or about 86 pounds for milk and about 82.5 pounds for cream.

TABLE 398.—*Milk, condensed and evaporated: International trade; average 1925–1929, annual 1927–1930*

Country	Calendar year									
	Average 1925–1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Netherlands	319, 831	291	324, 800	279	354, 572	359	378, 059	139	393, 151	695
United States	118, 215	2, 830	103, 028	2, 624	115, 551	2, 608	110, 185	2, 634	90, 459	1, 611
Switzerland	76, 691	35	81, 234	11	82, 252	14	78, 475	13	72, 660	15
Denmark	55, 666	17	55, 304	14	52, 597	13	54, 934	2	51, 916	------
Canada	32, 288	142	33, 680	125	27, 118	137	26, 746	179	20, 471	164
Australia [2]	20, 852	70	15, 725	96	19, 975	27	17, 395	52	------	------
Norway	18, 462	789	16, 698	747	18, 747	646	15, 534	323	13, 447	111
Italy	9, 842	1, 335	8, 905	1, 335	7, 093	1, 728	4, 821	2, 124	5, 141	1, 751
Irish Free State	8, 658	1, 598	6, 302	1, 494	10, 747	1, 282	10, 503	1, 116	10, 321	909
Belgium [3]	2, 582	2, 037	2, 615	998	3, 516	1, 296	4, 369	4, 099	7, 390	5, 554
Czechoslovakia	1, 535	364	315	141	2, 753	228	2, 830	271	2, 754	223
New Zealand [4]	1, 494	23	1, 557	3	1, 367	3	2, 175	7	2, 331	1
Total	666, 116	9, 531	650, 163	7, 867	696, 288	8, 341	706, 026	10, 959	670, 041	11, 034
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom	21, 866	280, 504	27, 771	283, 789	25, 046	301, 978	27, 732	296, 501	22, 441	291, 010
Cuba	0	47, 460	0	50, 586	0	44, 340	0	46, 492	0	38, 767
Dutch East Indies	15	27, 265	0	26, 149	0	30, 875	0	34, 990	0	33, 416
Philippine Islands	0	25, 810	0	25, 974	0	26, 524	0	29, 875	0	29, 077
British India	0	22, 365	0	24, 933	0	26, 354	0	27, 436	0	27, 280
Germany [5]	1, 960	15, 079	980	13, 434	1, 477	13, 290	4, 235	8, 264	6, 772	4, 351
France	9, 174	13, 793	9, 454	11, 299	12, 483	12, 271	11, 520	14, 477	14, 608	14, 964
China	0	12, 227	0	11, 095	0	14, 643	0	13, 285	0	11, 353
Union of South Africa	27	11, 305	29	11, 330	45	12, 020	16	12, 132	447	4, 310
Japan	320	9, 171	399	9, 510	385	8, 411	317	8, 865	786	8, 396
Peru	0	8, 593	0	7, 629	0	8, 444	0	8, 667	0	------
Siam [6]	0	7, 076	0	7, 847	0	8, 827	0	8, 447	0	------
Indo-China	162	6, 730	174	5, 955	[2] 123	[2] 7, 603	[2] 72	[3] 9, 709	------	------
Greece	0	6, 644	0	7, 052	0	8, 043	0	7, 879	0	7, 218
Jamaica	0	4, 198	0	4, 103	0	4, 614	0	5, 084	0	5, 129
Algeria	155	3, 768	[2] 129	[2] 3, 682	[2] 205	[2] 5, 291	[2] 144	[2] 4, 094	------	------
Trinidad and Tobago	0	3, 181	0	3, 132	0	3, 706	0	3, 850	0	4, 130
Tunis	0	2, 343	0	2, 644	0	2, 707	0	2, 692	0	3, 118
Brazil	0	1, 431	0	1, 947	0	1, 355	0	1, 252	0	1, 204
Argentina	15	1, 418	28	1, 446	12	1, 353	15	1, 578	17	1, 550
Egypt	353	1, 356	351	1, 395	368	1, 347	504	1, 525	123	1, 808
Austria	213	1, 214	254	1, 105	349	1, 205	371	1, 247	676	1, 384
Poland	34	327	22	264	18	464	1	385	7	267
Total	34, 294	513, 258	39, 591	516, 300	40, 511	545, 665	44, 927	548, 726	45, 877	488, 732

Bureau of Agricultural Economics. Official sources except where otherwise stated.

[1] Preliminary.
[2] International Yearbook of Agricultural Statistics.
[3] Exports include powdered milk.
[4] Imports include powdered milk.
[5] Includes some powdered milk.
[6] Figures for 12 months ending March 31 of following year.

TABLE 399.—*Milk: Estimated average price per 100 pounds received by producers, United States, 1923–1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
1923	------	------	------	------	------	------	------	------	2. 81	2. 98	3. 02	2. 92
1924	2. 86	2. 84	2. 75	2. 50	2. 40	2. 40	2. 29	2. 18	2. 35	2. 43	2. 45	2. 55
1925	2. 48	2. 55	2. 62	2. 48	2. 47	2. 47	2. 45	2. 55	2. 56	2. 73	2. 69	2. 65
1926	2. 74	2. 68	2. 56	2. 46	2. 39	2. 35	2. 40	2. 37	2. 47	2. 46	2. 60	2. 61
1927	2. 68	2. 64	2. 55	2. 58	2. 51	2. 44	2. 40	2. 36	2. 48	2. 55	2. 56	2. 64
1928	2. 67	2. 69	2. 61	2. 51	2. 49	2. 45	2. 45	2. 46	2. 56	2. 60	2. 63	2. 65
1929	2. 64	2. 64	2. 63	2. 59	2. 53	2. 47	2. 46	2. 50	2. 52	2. 55	2. 59	2. 60
1930	2. 53	2. 44	2. 38	2. 35	2. 28	2. 22	2. 15	2. 18	2. 25	2. 30	2. 31	2. 20
1931	2. 04	1. 96	1. 92	1. 85	1. 73	1. 66	1. 62	1. 64	1. 70	1. 72	1. 73	1. 67

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by number of milk cows Jan. 1, to obtain a price for the United States. Prices quoted are for milk sold to dealers, factories, etc.

TABLE 400.—*Milk, standard or grade B: Retail price per quart, delivered to family trade in cities, 1931*

City	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
Boston	13½	12½	12½	12½	12½	12½	12½	13½	13½	13½	13½	12½	12¾
New York	15	15	15	15	15	15	15	15	15	15	14	12	14⅔
Philadelphia	12	12	12	12	12	12	12	12	11	11	11	11	11⅔
Pittsburgh	13	12	12	12	12	12	12	------	12	11	11	9	------
Cleveland	11	11	11	12	12	11	10	10	10	10	10	10	10⅔
Indianapolis	11	11	10	10	10	10	10	10	10	10	10	10	10⅙
Chicago	13	13	13	13	13	13	13	13	13	13	13	13	13
Detroit	13	12	12½	12	12	11	10	11	12	12	11	11	11¾
Milwaukee	10	10	10	10	10	10	10	10	10	10	10	9	9¾
Minneapolis	10	10	10	10	10	10	10	10	10	10	10	10	10
St. Louis	12	12	12	12	12	12	12	12	11	11	11	11	11⅔
Kansas City, Mo	13	13	13	13	12	12	12	12	12	12	12	11	12¼
Washington, D. C	14½	14½	14½	14	14	14	14	14	14	14	14	14	14⅛
Jacksonville	19	19	19	15½	15½	15½	13½	15	13¾	14½	14½	14½	15¾
Louisville	12	11	10	10	11	11	11	12	12	12	12	12	11⅓
Birmingham	16	16	14	14	14	12	12	12	13	13	13½	13	13½
New Orleans	14	14	14	14	12	12	12	12	12	12	12	12	12⅔
Dallas	13	12	12	12	12	10	------	10	10	10	10	10	------
Butte	13	------	13	------	------	13	12	------	12	12	12	12	------
Denver	10	------	------	10	10	10	10	------	10	------	10	10	------
Salt Lake City	------	10	------	------	10	------	10	10	10	10	10	9½	------
Seattle	11	11	11	10½	10½	10½	10½	10½	10½	10½	10½	11	10⅔
Portland, Oreg	11½	11	11	10½	10	10	10	------	10	------	10	10	------
Los Angeles	------	13	13	13	13	13	13	13	12	12	12	12	------
San Francisco	13½	13	13	13	13	13	13	10	10	10	10	10	11¾

Bureau of Agricultural Economics. Compiled from reports of the bureau secured through the cooperation of milk distributors, producers' associations, and municipal officers.

TABLE 401.—*Butterfat: Estimated average price per pound received by producers, United States, 1922–1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922	33.4	34.0	34.5	33.4	33.4	33.9	34.8	32.8	35.5	39.2	44.2	50.3	35.9
1923	47.0	44.9	44.9	46.0	40.3	36.9	36.7	38.7	42.2	44.1	47.8	49.2	42.2
1924	50.6	48.5	46.4	40.8	37.6	37.1	37.8	35.8	36.6	36.6	37.0	41.1	39.8
1925	40.6	37.9	41.5	40.5	40.3	39.9	40.5	41.3	42.6	47.1	47.8	47.6	41.9
1926	45.2	43.1	42.9	40.4	39.1	39.3	38.6	38.6	40.5	42.4	44.8	47.9	41.3
1927	46.9	46.8	48.0	47.1	43.6	40.8	40.3	39.4	41.6	44.4	45.8	47.8	43.7
1928	48.5	46.0	46.5	45.4	44.4	43.5	43.3	44.3	46.5	47.0	47.6	49.2	45.6
1929	47.6	47.8	48.3	46.5	45.4	43.6	43.4	43.3	44.6	45.6	43.5	41.9	44.9
1930	36.7	35.4	34.9	37.3	36.5	31.6	31.6	35.2	37.7	37.0	35.3	30.6	34.8
1931	26.2	25.0	27.5	26.4	21.2	20.5	21.1	23.9	26.6	30.3	28.2	27.3	24.7

Bureau of Agricultural Economics. Quotations cover butterfat for all uses. Based on reports of special price reporters. Monthly prices by States, weighted by number of milk cows Jan. 1, to obtain a price for the United States; yearly price obtained by weighting monthly prices by production of creamery butter.

TABLE 402.—*Creamery butter: Production reported by factories, United States 1922–1930*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
1922	73, 505	67, 405	79, 532	86, 623	132, 351	150, 034	135, 231	114, 160	92, 359	83, 070	68, 628	70, 617	1, 153, 515
1923	83, 688	74, 134	88, 311	100, 547	134, 350	158, 371	138, 278	120, 802	102, 273	89, 297	74, 909	77, 254	1, 242, 214
1924	87, 468	86, 731	95, 760	106, 012	139, 954	161, 992	164, 443	137, 836	115, 102	100, 536	77, 282	82, 964	1, 356, 080
1925	87, 121	80, 218	92, 302	107, 023	145, 478	164, 253	158, 920	136, 738	108, 325	104, 520	85, 492	91, 136	1, 361, 526
1926	97, 893	94, 222	112, 432	121, 049	155, 912	178, 276	159, 554	133, 294	116, 732	103, 068	88, 481	90, 853	1, 451, 766
1927	97, 965	95, 522	111, 451	126, 415	168, 808	188, 792	170, 484	146, 808	113, 546	102, 399	86, 058	88, 247	1, 496, 495
1928	101, 045	99, 394	111, 777	118, 849	156, 294	181, 037	167, 601	145, 430	119, 499	105, 894	87, 745	92, 484	1, 487, 049
1929	103, 519	99, 963	114, 404	133, 684	174, 341	192, 869	185, 317	152, 192	123, 582	118, 116	97, 186	101, 854	1, 597, 027
1930	108, 382	102,252	115, 679	133, 271	184, 385	189, 788	167, 559	137, 420	122, 580	120, 247	101,974	111, 694	1, 595, 231

Bureau of Agricultural Economics. The 1929 and 1930 statistics are the most complete since these reports were inaugurated in 1918. Some allowance, therefore, should be made for this when comparing 1929 and 1930 production with that of previous years.

TABLE 403.—*Creamery butter production in factories in the United States, by States, 1922–1930*

State	1922	1923	1924	1925	1926	1927	1928	1929	1930
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Maine	596	402	568	479	547	517	348	256	202
New Hampshire	309	424	271	137	90	72	44	28	22
Vermont	12,289	11,935	12,294	9,372	8,305	6,732	5,469	3,776	3,581
Massachusetts	2,999	1,844	1,790	2,026	2,150	2,514	2,340	1,496	1,869
Rhode Island	76	76	105	68	75	100	66	48	28
Connecticut	986	753	820	675	617	550	401	371	364
New England	17,255	15,434	15,848	12,757	11,784	10,485	8,668	5,975	6,066
New York	25,474	18,893	25,974	16,960	14,222	12,864	11,557	9,104	9,617
New Jersey	261	437	642	170	49	101	15	14	41
Pennsylvania	12,803	13,142	12,444	11,476	11,808	11,709	11,349	11,113	10,766
Middle Atlantic	38,538	32,472	39,060	28,606	26,079	24,674	22,921	20,231	20,424
Ohio	84,193	79,195	80,932	77,566	79,386	79,603	75,681	80,583	78,972
Indiana	48,158	51,484	54,355	54,362	57,592	62,436	60,409	62,701	63,249
Illinois	47,249	51,359	58,225	56,872	62,544	59,875	62,864	69,272	65,281
Michigan	59,954	64,818	70,676	70,729	72,040	69,368	65,803	63,426	65,926
Wisconsin	142,235	139,895	153,335	161,360	159,733	153,545	137,483	155,815	171,644
North Cent. E	381,789	386,751	417,523	420,898	431,295	424,827	402,240	431,797	445,072
Minnesota	170,463	199,926	229,474	245,669	268,437	274,860	271,345	282,884	282,540
Iowa	129,778	141,407	159,378	156,361	168,827	177,224	196,068	214,562	216,058
Missouri	46,565	51,818	56,801	55,953	66,861	62,549	69,201	82,505	77,939
North Dakota	21,675	23,355	28,515	31,500	34,898	32,462	30,889	41,889	41,032
South Dakota	21,146	27,447	24,643	29,193	29,814	32,843	34,853	40,361	40,406
Nebraska	74,809	76,748	81,423	83,930	90,882	95,004	96,472	97,110	85,623
Kansas	40,204	42,674	46,844	47,768	50,998	50,667	55,756	58,967	56,919
North Cent. W	504,640	563,375	627,078	650,374	710,717	725,609	754,584	818,278	800,517
Delaware	203	154	150	80	67	50	47	42	41
Maryland	542	382	500	339	266	229	223	172	95
Dist. of Columbia	475	10	------	461	52	------	------	------	------
Virginia	3,118	4,231	4,614	3,842	4,378	5,881	6,051	5,882	5,255
West Virginia	420	276	466	533	487	287	325	381	462
North Carolina	1,549	1,718	1,683	1,556	1,680	2,032	1,849	2,189	2,050
South Carolina	165	537	527	429	364	432	392	496	453
Georgia	979	1,868	1,826	1,836	1,982	3,044	2,224	2,124	2,397
Florida	81	99	20	22	105	129	153	93	107
South Atlantic	7,532	9,275	9,786	9,098	9,381	12,084	11,264	11,379	10,860
Kentucky	12,010	12,244	12,942	14,087	16,975	19,364	19,822	20,050	17,645
Tennessee	9,164	11,463	12,762	11,286	11,826	17,190	15,333	17,929	15,745
Alabama	917	831	839	1,086	991	1,237	991	2,041	2,160
Mississippi	5,778	5,715	5,648	4,895	6,896	7,920	7,241	7,429	6,048
South Cent. E	27,869	30,253	32,191	31,354	36,688	45,711	43,387	47,449	41,598
Arkansas	731	996	1,259	1,174	1,325	1,710	1,115	2,778	2,039
Louisiana	87	185	125	90	92	324	461	882	705
Oklahoma	11,142	14,065	14,421	15,841	19,664	23,617	24,277	25,770	24,654
Texas	10,179	10,956	11,997	10,866	14,594	24,276	20,599	26,511	25,083
South Cent. W	22,139	26,202	27,802	27,971	35,675	49,927	46,452	55,941	52,481
Wyoming	1,403	1,894	1,941	1,999	2,289	2,009	1,831	2,320	2,255
Colorado	16,410	18,625	18,130	18,794	18,255	20,871	21,614	21,924	22,643
New Mexico	129	185	251	326	455	447	421	535	951
Idaho	7,582	9,883	13,431	15,101	18,456	20,918	20,832	24,017	26,353
Arizona	623	600	2,107	1,034	1,489	2,150	2,246	1,922	1,994
Utah	5,913	7,500	8,585	7,034	8,037	9,909	9,549	11,068	11,969
Nevada	2,642	2,361	2,640	2,593	2,432	2,187	2,211	2,231	1,993
Montana	7,713	10,667	13,874	13,968	15,549	16,759	16,364	16,684	16,792
Mountain	42,415	51,715	60,959	60,849	66,962	75,250	75,068	80,701	84,950
Washington	24,239	26,666	29,331	25,673	28,914	29,870	29,452	30,228	32,256
Oregon	17,158	18,128	20,993	21,575	22,570	22,831	20,963	22,413	26,641
California	69,941	81,943	75,509	72,371	71,701	75,227	72,050	72,635	74,366
Pacific	111,338	126,737	125,833	119,619	123,185	127,928	122,465	125,276	133,263
Total	1,153,515	1,242,214	1,356,080	1,361,526	1,451,766	1,496,495	1,487,049	1,597,027	1,595,231

Bureau of Agricultural Economics. The compilations are made from reports of factories to the bureau. The 1929 and 1930 statistics are the most complete since these reports were inaugurated in 1918. Some allowance, therefore, should be made for this when comparing 1929 and 1930 production with that of previous years.

TABLE 404.—*Creamery butter: Receipts, gross weight*[1], *at five markets, by months, specified years*

Market and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
New York:													
1929	19, 498	18, 873	20, 486	21, 895	26, 751	27, 936	29, 700	23, 854	20, 657	20, 983	17, 032	18, 095	265, 760
1930	20, 877	19, 579	21, 523	22, 868	26, 723	29, 898	27, 567	19, 519	19, 690	19, 431	17, 910	22, 485	268, 070
1931	22, 639	21, 645	22, 237	23, 169	25, 280	31, 434	25, 661	18, 860	19, 334	20, 904	20, 773	22, 282	274, 218
Chicago:													
1929	18, 158	16, 356	18, 758	19, 056	25, 935	30, 081	27, 119	22, 793	17, 130	16, 832	15, 766	16, 648	244, 632
1930	16, 837	16, 422	19, 877	20, 317	27, 434	29, 585	24, 689	18, 189	15, 979	15, 191	14, 349	14, 769	233, 638
1931	16, 375	15, 584	19, 601	21, 833	27, 162	32, 112	24, 265	18, 354	16, 584	17, 267	17, 503	17, 055	243, 695
Philadelphia:													
1929	6, 781	6, 158	7, 006	6, 745	8, 839	9, 491	8, 918	7, 570	6, 673	6, 309	6, 342	6, 554	87, 386
1930	6, 956	6, 144	6, 674	7, 119	8, 263	9, 183	8, 127	6, 127	5, 942	5. 649	5, 976	7, 602	83, 762
1931	7, 768	6, 972	7, 744	8, 170	8, 536	10, 247	7, 509	6, 468	6, 799	6, 036	6, 660	7, 676	90, 585
Boston:													
1929	6, 091	5, 259	5, 915	6, 656	9, 216	10, 787	11, 063	7, 812	5, 922	4, 652	4, 030	3, 780	81, 183
1930	4, 615	4, 266	5, 225	6, 257	8, 646	10, 899	9, 640	6, 524	4, 691	3, 790	3, 368	4, 534	72, 455
1931	5, 028	4, 911	5, 281	6, 533	8, 163	9, 874	8, 591	6, 537	5, 507	5, 292	5, 664	5, 819	77, 200
San Francisco:													
1929	1, 962	1, 911	1, 814	2, 529	3, 138	2, 885	2, 642	2, 074	1, 590	1, 470	1, 569	1, 571	25, 155
1930	1, 590	1, 555	1, 881	2, 566	3, 438	2, 769	2, 639	1, 975	1, 442	1, 467	1, 515	1, 901	24, 738
1931	1, 530	1, 417	2, 148	2, 928	3, 134	3, 009	2, 300	2, 440	1, 859	1, 743	1, 886	2, 298	26, 692
Total:													
1922	41, 775	39, 041	45, 101	40, 716	67, 063	92, 632	76, 918	60, 172	45, 577	40, 595	37, 372	38, 401	625, 363
1923	47, 843	39, 877	48, 955	47, 947	64, 328	89, 976	75, 336	56, 243	49, 307	45, 393	39, 759	41, 460	646, 424
1924	44, 476	47, 756	52, 328	51, 690	67, 572	91, 742	92, 036	67, 959	56, 247	49, 760	35, 868	39, 471	696, 905
1925	44, 825	41, 785	48, 351	50, 035	67, 454	88, 024	82, 918	68, 341	53, 303	51, 599	42, 099	42, 993	681, 727
1926	46, 809	46, 809	54, 646	53, 990	64, 653	89, 993	81, 053	59, 849	52, 985	45, 280	40, 588	42, 825	679, 480
1927	44, 756	45, 502	53, 633	57, 298	75, 535	89, 773	79, 670	68, 055	50, 055	45, 425	39, 895	39, 978	689, 575
1928	50, 095	47, 797	54, 300	52, 158	63, 582	81, 318	75, 901	64, 531	52, 481	48, 907	42, 796	43, 092	676, 958
1929	52, 490	48, 557	53, 979	56, 881	73, 879	81, 180	79, 442	64, 103	51, 972	50, 246	44, 739	46, 648	704, 116
1930	50, 875	47, 966	55, 180	59, 127	74, 504	82, 334	72, 662	52, 334	47, 744	45, 528	43, 118	51, 291	682, 663
1931	53, 340	50, 529	57, 011	62, 633	72, 275	86, 676	68, 326	52, 659	50, 083	51, 242	52, 486	55, 130	712, 390

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets.

[1] Gross weight includes container and wrapping.

TABLE 405.—*Creamery butter:*[1] *Cold-storage holdings, United States, 1922–1931*

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
1922	48, 412	35, 047	22, 582	9, 113	3, 830	13, 202	67, 410	103, 151	112, 039	96, 680	73, 857	47, 773
1923	26, 819	16, 122	8, 910	4, 824	3, 248	10, 112	62, 768	101, 774	102, 731	96, 117	76, 472	51, 508
1924	30, 299	15, 246	9, 847	7, 842	8, 913	22, 348	74, 184	134, 118	156, 440	153, 494	135, 018	100, 832
1925	65, 694	45, 748	28, 789	10, 875	3, 739	13, 036	63, 687	109, 075	128, 403	114, 172	94, 916	74, 754
1926	52, 785	39, 381	26, 313	17, 392	17, 527	30, 561	86, 897	131, 152	138, 151	125, 342	100, 871	64, 381
1927	34, 347	17, 952	7, 952	3, 044	3, 436	25, 404	89, 996	145, 147	163, 701	147, 396	118, 679	83, 224
1928	46, 289	28, 273	14, 404	5, 716	5, 109	15, 952	69, 750	120, 437	136, 175	128, 071	105, 811	70, 985
1929	43, 783	24, 747	11, 910	5, 532	5, 883	28, 369	91, 962	151, 621	168, 952	158, 541	138, 405	111, 650
1930	81, 935	60, 230	46, 530	30, 556	22, 957	50, 378	106, 522	145, 061	143, 089	131, 489	109, 646	88, 012
1931	63, 401	46, 792	30, 672	18, 010	17, 195	35, 155	89, 172	115, 121	104, 678	80, 152	56, 229	42, 242

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

[1] Quantities given are net weights.

TABLE 406.—*Butter: Receipts, gross weight,*[1] *at five markets, by State of origin, 1927–1931*

Market and origin	1927	1928	1929	1930	1931
NEW YORK	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
Ala	220	370	154	159	110
Ark	84	42	247	153	224
Calif	161	218	1	82	48
Ga	38	86	39	137	120
Ill	37, 954	35, 816	35, 738	34, 307	35, 186
Ind	5, 417	5, 150	4, 890	4, 799	5, 106
Iowa	66, 935	68, 676	78, 347	74, 630	74, 145
Kans	3, 808	4, 797	6, 520	7, 512	7, 136
Ky	978	884	617	573	549
Md	131	283	196	240	15
Mass	223	66	15	87	206
Mich	13, 566	15, 227	7, 555	8, 802	12, 691
Minn	57, 081	44, 654	56, 333	65, 883	62, 081
Miss	1, 251	812	1, 070	623	795
Mo	6, 540	6, 182	6, 573	4, 345	5, 582
Mont	288	296	278	337	28
Nebr	28, 457	28, 138	26, 803	26, 825	29, 877
N. J	256	93	123	1	112
N. Y	5, 385	5, 978	5, 097	7, 119	4, 837
N. C	340	415	429	215	55
N. Dak	573	2, 397	2, 052	2, 514	5, 798
Ohio	7, 565	7, 498	6, 217	6, 925	7, 155
Okla	363	502	1, 302	771	1, 417
Pa	1, 025	1, 074	1, 923	1, 982	1, 850
S. Dak	1, 129	1, 290	1, 503	1, 151	984
Tenn	2, 369	2, 305	2, 906	2, 465	1, 614
Tex	359	831	2, 304	995	930
Va	473	535	467	244	273
Wash	310	26	27	29	26
Wis	17, 615	15, 459	15, 839	13, 917	14, 503
Other States	339	419	193	201	165
Canada	89	74	2	47	600
Total	261, 322	250, 593	265, 760	268, 070	274, 218
CHICAGO					
Ark	130	68	155	118	229
Colo	678	1, 315	977	780	242
Idaho	-------	7	8	27	-------
Ill	8, 057	6, 371	8, 406	15, 594	20, 061
Ind	749	943	1, 098	1, 217	1, 375
Iowa	39, 347	39, 948	44, 152	39, 606	42, 450
Kans	9, 989	12, 981	11, 185	9, 928	15, 283
Ky	1, 888	1, 894	2, 067	1, 353	989
Mich	1, 024	923	854	576	877
Minn	48, 057	50, 230	54, 043	46, 380	39, 550
Miss	31	49	239	143	290
Mo	13, 484	11, 508	13, 020	12, 487	14, 866
Mont	194	165	235	159	3
Nebr	17, 090	19, 498	17, 450	16, 225	15, 136
N. Y	31	275	35	107	28
N. Dak	4, 181	2, 919	3, 287	2, 384	3, 053
Ohio	194	128	78	251	607
Okla	4, 510	2, 329	3, 175	3, 104	4, 507
S. Dak	16, 513	18, 270	16, 187	13, 496	12, 855
Tenn	438	113	166	75	31
Tex	3, 680	2, 322	2, 325	1, 483	2, 920
Wis	64, 611	58, 108	65, 356	68, 047	68, 190
Other States	324	150	134	98	153
Canada	-------	-------	-------	-------	-------
Total	235, 200	230, 514	244, 632	233, 638	243, 695
PHILADELPHIA					
Ala	168	30	26	17	103
Ill	4, 807	3, 811	4, 023	4, 652	9, 166
Ind	1, 736	1, 502	1, 523	1, 647	1, 298
PHILA.—con.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
Iowa	5, 237	4, 808	6, 446	6, 220	6, 825
Kans	370	384	135	70	387
Ky	313	212	130	111	365
Md	205	98	85	72	41
Mich	1, 835	1, 356	568	1, 342	3, 029
Minn	45, 478	54, 427	54, 499	52, 743	50, 864
Miss	493	695	214	268	335
Mo	1, 444	1, 921	2, 385	1, 767	3, 115
Nebr	4, 341	4, 271	5, 038	2, 824	4, 083
N. Y	596	690	529	694	859
N. C	33	5	96	148	77
Ohio	3, 162	2, 665	1, 934	1, 854	1, 261
Pa	1, 097	731	612	626	656
S. Dak	263	418	582	215	401
Tenn	1, 969	1, 742	2, 360	1, 967	973
Tex	69	26	41	222	842
Va	935	881	1, 289	665	990
W. Va	277	225	53	55	66
Wis	6, 313	3, 307	4, 585	5, 395	4, 185
Other States	586	290	233	188	640
Canada	------	------	------	------	24
Total	81, 727	84, 495	87, 386	83, 762	90, 585
BOSTON					
Colo	22	867	442	83	129
Ill	13, 557	12, 251	11, 893	12, 065	13, 493
Ind	1, 576	1, 808	3, 495	2, 842	2, 917
Iowa	3, 969	4, 261	4, 257	4, 397	3, 173
Kans	1, 532	1, 801	1, 268	796	587
Ky	228	298	580	222	47
Mass	346	168	15	3	99
Mich	1, 675	1, 787	703	993	1, 279
Minn	30, 830	33, 652	28, 908	29, 119	32, 719
Mo	3, 151	3, 989	3, 221	2, 408	2, 224
Mont	183	14	29	237	87
Nebr	10, 335	12, 159	12, 315	7, 438	4, 746
N. H	94	14	3	2	5
N. Y	2, 607	1, 626	1, 380	1, 208	1, 954
N. Dak	1, 871	1, 227	2, 247	880	1, 863
Ohio	2, 751	2, 879	3, 214	2, 942	4, 267
Okla	664	575	825	540	964
Pa	240	95	192	81	250
S. Dak	3, 526	2, 985	2, 851	1, 911	2, 562
Tenn	------	------	104	119	143
Tex	27	170	550	251	461
Vt	2, 318	1, 974	781	185	154
Wis	2, 238	2, 057	1, 679	3, 292	2, 885
Other States	872	665	231	441	192
Canada	5	2	------	------	------
Total	84, 617	87, 324	81, 183	72, 455	77, 200
SAN FRANCISCO					
Calif	18, 976	17, 732	19, 070	18, 110	18, 473
Colo	406	260	159	93	144
Idaho	1, 722	1, 255	1, 361	1, 223	1, 515
Mont	2, 173	2, 150	1, 222	2, 018	1, 424
Nebr	77	33	81	87	37
Nev	113	74	41	184	14
Ore	2, 253	1, 796	2, 748	2, 489	3, 687
Utah	223	384	134	35	38
Wash	300	182	231	495	1, 340
Other States	466	166	108	4	29
Canada	------	------	------	------	------
Total	26, 709	24, 032	25, 155	24, 738	26, 692

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets.

[1] Gross weight includes container and wrapping.

TABLE 407.—*Butter: International trade, average 1925–1929, annual 1927–1930*

Country	Average 1925–1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Denmark	310, 967	1, 886	315, 721	1, 826	325, 710	1, 621	350, 616	1, 424	372, 553	1, 388
New Zealand	156, 179	6	163, 020	0	162, 352	0	185, 226	1	211, 035	1
Australia [2]	100, 464	3, 448	75, 088	10, 935	112, 811	2, 561	102, 913	4	---------	---------
Netherlands	100, 310	4, 548	105, 714	4, 041	103, 485	5, 123	104, 323	4, 469	92, 393	4, 396
Russia	62, 901	0	71, 747	0	71, 888	0	55, 933	0	23, 197	0
Argentina	50, 410	7	46, 808	3	44, 182	7	37, 547	2	51, 156	7
Irish Free State	58, 409	6, 215	65, 576	4, 836	62, 623	5, 879	62, 774	4, 478	58, 766	3, 391
Sweden	37, 607	133	40, 707	63	38, 679	93	54, 960	24	58, 805	19
Finland	31, 509	42	33, 238	2	29, 488	3	36, 610	3	37, 726	---------
Latvia	24, 641	0	23, 724	0	28, 673	0	32, 694	0	40, 633	0
Estonia	21, 439	6	21, 839	0	24, 741	31	27, 247	1	31, 010	0
Poland	17, 426	350	16, 261	141	24, 194	77	33, 248	112	26, 713	30
France	15, 848	6, 796	21, 039	10, 854	22, 227	5, 217	16, 722	9, 753	12, 095	12, 922
Italy	3, 985	1, 600	2, 805	2, 085	1, 779	3, 565	1, 651	1, 937	1, 843	3, 131
Yugoslavia	571	2	769	1	482	0	635	0	655	1
Total	992, 666	25, 039	1, 004, 056	34, 787	1, 053, 314	24, 177	1, 103, 099	22, 208	1, 018, 580	25, 286
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom	1, 465	647, 350	1, 703	625, 144	1, 395	666, 231	1, 096	702, 749	1, 115	744, 623
Germany	275	249, 016	191	238, 682	281	279, 000	337	298, 821	578	293, 557
Switzerland	155	18, 070	159	18, 727	150	18, 061	158	16, 650	40	18, 795
Canada	8, 510	14, 638	2, 696	11, 209	1, 995	16, 802	1, 400	35, 928	1, 180	38, 606
Dutch East Indies	0	9, 758	0	9, 169	0	11, 086	0	11, 098	0	10, 910
United States	4, 558	6, 227	4, 343	8, 460	3, 898	4, 659	3, 724	2, 773	2, 954	2, 472
Belgium	2, 490	5, 848	2, 957	2, 559	3, 712	2, 917	3, 009	9, 559	2, 648	22, 413
Austria	932	2, 921	440	4, 220	1, 094	1, 785	2, 211	1, 099	4, 111	544
Union of South Africa	839	2, 420	334	2, 920	393	3, 921	2, 337	1, 604	2, 904	1, 690
Egypt	53	2, 341	86	2, 552	51	1, 774	30	2, 158	23	2, 935
Algeria	48	2, 055	[2] 48	[2] 2, 124	[2] 41	[2] 2, 496	[2] 64	[2] 2, 317	---------	---------
Norway	421	1, 846	25	2, 511	82	1, 533	1, 191	1, 352	236	1, 529
British Malaya	187	1, 811	153	1, 763	181	2, 196	177	1, 930	193	2, 067
Cuba	5	1, 780	0	1, 878	3	1, 204	21	992	38	448
Peru	5	1, 708	9	1, 444	2	2, 116	2	1, 484	4	---------
China	0	1, 661	0	1, 530	0	1, 945	0	1, 372	0	1, 417
Greece	[3] 0	1, 251	---------	1, 625	0	1, 172	---------	1, 537	---------	1, 420
Philippine Islands	0	1, 200	0	1, 072	0	1, 412	0	1, 338	0	1, 188
Czechoslovakia	605	1, 174	369	1, 683	1, 296	990	716	835	695	714
Trinidad and Tobago	0	1, 139	0	1, 344	0	823	0	1, 524	0	1, 058
Spain	328	363	303	337	170	467	177	409	160	329
Total	20, 876	974, 577	13, 816	940, 953	14, 744	1, 022, 590	16, 650	1, 097, 529	16, 879	1, 146, 715

Bureau of Agricultural Economics. Official sources except where otherwise noted. Butter includes all butter made from milk, melted and renovated butter, but does not include margarine, cocoa butter or ghee.

[1] Preliminary.
[2] International Yearbook of Agricultural Statistics.
[3] 2-year average.

TABLE 408.—*Butter, 92-score creamery: Average wholesale price, at five leading markets, by months, specified years*

Market and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
New York:	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1910	33	30	33	31	28	28	28	29	30	30	31	30	30
1911	26	26	24	21	22	23	25	26	27	30	34	37	27
1912	39	32	31	33	30	27	27	27	30	31	34	37	32
1913	35	36	37	35	29	28	27	28	32	31	34	36	32
1914	33	29	28	25	26	27	28	30	31	32	35	34	30
1915	34	32	30	31	29	28	27	26	27	29	31	35	30
1916	33	34	37	36	31	30	29	31	34	35	39	40	34
1917	40	44	42	44	40	39	39	41	44	45	46	50	43
1918	52	50	44	42	42	44	45	46	56	58	63	69	51
1919	62	52	62	64	58	52	53	55	59	68	71	72	61
1920	65	66	67	71	61	57	57	55	59	60	63	55	61
1921	52	47	48	46	32	33	40	43	43	47	45	44	43
1922	37	37	38	38	38	37	36	35	41	46	51	54	41
1923	52	50	49	46	42	39	39	44	46	48	53	55	47
1924	53	50	47	38	39	41	40	38	38	39	43	45	43
1925	40	41	48	45	43	42	43	43	48	51	51	49	45
1926	45	45	43	39	41	41	40	42	45	47	51	55	44
1927	49	52	50	50	43	43	42	42	46	48	50	52	47
1928	49	47	49	45	45	44	45	47	49	48	51	50	47
1929	48	50	48	45	44	44	42	43	46	46	43	41	45
1930	37	36	37	39	35	33	35	39	40	40	36	32	37
1931	28	28	29	26	24	23	25	28	32	34	31	31	28
Chicago:													
1927	48	50	49	48	41	40	40	41	45	46	48	51	46
1928	47	46	48	44	43	43	44	46	47	46	49	49	46
1929	47	49	48	44	42	42	41	42	45	44	41	39	44
1930	35	35	37	37	34	32	35	38	38	38	34	31	35
1931	27	27	29	24	22	22	24	27	30	32	30	29	27
San Francisco:													
1927	47	48	45	42	41	42	42	44	47	48	49	48	45
1928	46	45	43	40	42	43	46	48	50	51	49	50	46
1929	46	47	45	43	45	45	45	46	49	48	48	42	46
1930	36	38	38	39	37	34	34	37	39	37	34	33	36
1931	26	28	28	24	25	25	26	30	31	32	32	30	28
Philadelphia:													
1927	50	52	51	51	44	43	43	43	47	49	51	53	48
1928	50	48	50	46	46	45	46	48	50	49	52	51	48
1929	49	51	49	46	45	45	43	44	47	47	44	42	46
1930	38	36	38	40	36	34	36	40	41	41	37	33	38
1931	30	29	30	27	25	24	26	29	34	35	32	32	29
Boston:													
1927	50	52	51	51	44	43	42	42	46	48	48	50	47
1928	49	47	50	46	45	44	45	47	49	48	50	50	48
1929	48	50	49	46	44	44	43	44	46	46	43	41	45
1930	37	36	38	39	35	33	36	39	40	40	36	33	37
1931	29	29	29	27	24	24	25	28	32	34	31	31	29

Bureau of Agricultural Economics. Compiled from Urner-Barry reports, 1910–1917 (New York), average of daily range; subsequently from reports of bureau representatives in the markets. Earlier data available in 1925 Yearbook, p. 1094, 1927 Yearbook, p. 1082, and 1931 Yearbook, p. 921.

TABLE 409.—*Butter: Average export price per pound in Copenhagen, Denmark, 1922–1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1922	31.1	31.0	32.9	33.8	33.5	37.0	39.4	39.1	41.1	40.7	39.9	39.7	36.6
1923	40.5	41.3	41.0	34.5	29.5	29.3	30.7	34.7	40.3	38.9	39.4	41.4	36.8
1924	40.0	39.5	36.9	31.3	36.4	33.4	37.8	41.1	42.3	46.1	44.2	46.8	39.6
1925	42.0	45.4	46.1	40.6	36.9	39.4	40.5	44.2	45.7	46.5	44.6	37.8	42.5
1926	36.5	40.2	38.8	36.2	34.8	35.7	35.4	36.1	36.6	36.3	34.9	37.1	36.6
1927	36.4	39.3	36.8	35.2	32.9	33.2	32.2	35.0	39.6	39.4	41.2	38.0	36.6
1928	35.4	37.5	40.0	36.8	35.4	34.9	36.4	38.0	40.2	39.5	40.6	42.4	38.1
1929	39.1	39.0	35.5	32.8	33.4	35.1	35.3	35.6	39.7	40.5	38.7	35.8	36.7
1930	32.0	35.3	31.7	27.4	26.3	27.7	30.3	29.2	29.9	30.1	27.2	27.3	29.5
1931	26.7	29.5	27.0	24.3	23.3	23.3	23.2	24.5	24.5	21.2	19.9	18.8	23.8

Bureau of Agricultural Economics. Danish Butter Journal (Smor Tidende) official quotations. For earlier years, 1882–1921, see the United States Department of Agriculture Yearbook, 1923, p. 923.

Conversions from Danish quotations January, 1922 to December, 1926, inclusive, from weekly quotations in kroner per 100 kg., at average monthly exchange rate as quoted by Federal Reserve Board. Beginning January, 1927, to date at par of exchange.

TABLE 410.—*Butter, creamery: Average wholesale [1] prices per pound, all scores, by months, New York and Chicago, 1931*

NEW YORK

Month	93	92	91	90	89	88	87	86	Centralized car lots		
									90	89	88
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
January	29. 50	28. 50	28. 16	27. 83	27. 20	26. 44	25. 90				
February	29. 35	28. 40	27. 90	27. 35	26. 64	25. 95	25. 23				
March	29. 88	28. 88	28. 47	28. 11	27. 38	26. 54	26. 06				
April	27. 09	26. 10	25. 85	25. 63	25. 36	25. 02	24. 78				
May	24. 70	23. 70	23. 34	22. 97	22. 27	21. 81	21. 28				
June	24. 33	23. 33	22. 90	22. 32	21. 60	20. 95	20. 45				
July	25. 95	24. 95	24. 50	23. 70	23. 05	22. 22	21. 64				
August	29. 11	28. 12	27. 66	26. 99	26. 18	25. 41	24. 60				
September	33. 50	32. 50	31. 52	29. 00	27. 67	26. 94	26. 24				
October	34. 76	33. 76	32. 61	30. 19	28. 44	27. 85	27. 13				
November	31. 93	30. 93	30. 34	29. 60	28. 92	28. 32	27. 64				
December	31. 55	30. 55	29. 85	28. 48	26. 90	25. 92	25. 19				
Average	29. 30	28. 31	27. 76	26. 85	25. 97	25. 28	24. 68				

CHICAGO

Month	93	92	91	90	89	88	87	86	90	89	88
January	28. 10	27. 35	26. 61	26. 04	25. 54	24. 98	24. 25	23. 75	27. 22	25. 97	24. 97
February	27. 91	27. 15	26. 51	26. 01	25. 43	24. 84	24. 07	23. 57	26. 90	25. 85	24. 68
March	29. 44	28. 69	28. 12	27. 65	26. 94	26. 28	25. 23	24. 69	28. 61	27. 65	26. 25
April	25. 12	24. 37	24. 05	23. 78	23. 39	22. 96	22. 46	21. 84	24. 46	23. 58	22. 79
May	23. 12	22. 37	21. 82	21. 43	20. 85	20. 28	19. 44	18. 86	22. 48	21. 27	20. 31
June	23. 04	22. 30	21. 62	21. 13	20. 49	19. 88	18. 87	18. 37	22. 48	21. 21	19. 93
July	24. 60	23. 85	23. 14	22. 59	21. 88	21. 00	20. 10	19. 31	23. 97	22. 72	21. 19
August	27. 94	27. 19	26. 25	25. 47	24. 44	23. 23	22. 33	21. 63	26. 90	25. 05	23. 45
September	31. 01	30. 26	29. 16	27. 98	26. 52	25. 48	24. 48	23. 98	28. 98	26. 66	25. 41
October	32. 93	32. 18	31. 03	29. 76	28. 25	26. 65	25. 65	25. 04	31. 22	28. 09	26. 75
November	30. 45	29. 70	28. 79	28. 05	27. 05	26. 11	25. 07	24. 48	38. 20	26. 89	26. 15
December	29. 89	29. 15	27. 79	26. 81	25. 20	24. 30	23. 58	22. 94	26. 40	24. 64	24. 13
Average	27. 80	27. 05	26. 24	25. 56	24. 67	23. 83	22. 96	22. 37	26. 49	24. 97	23. 83

Bureau of Agricultural Economics.

[1] Principally sales by first-hand receivers to jobbers, chain stores, or other large distributors, in less-than carload lots, except as otherwise indicated.

TABLE 411.—*Cheese, whole milk American Cheddar: Production in the United States, 1920–1930*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
1920	10, 457	11, 509	14, 954	18, 856	29, 832	41, 376	34, 313	26, 787	22, 935	20, 054	13, 308	10, 303	254, 684
1921	11, 889	12, 857	17, 678	23, 521	34, 556	36, 444	26, 977	27, 652	23, 612	21, 496	13, 426	11, 618	261, 726
1922	12, 837	13, 927	18, 774	21, 740	31, 349	36, 254	33, 265	29, 496	25, 581	25, 785	18, 382	15, 416	282, 806
1923	15, 092	15, 326	20, 184	24, 014	32, 942	41, 382	38, 288	31, 822	28, 648	25, 566	18, 236	16, 608	308, 108
1924	17, 718	18, 886	22, 955	24, 597	33, 657	43, 517	40, 716	33, 602	30, 539	26, 210	17, 252	15, 046	324, 695
1925	16, 834	17, 991	21, 598	26, 889	38, 012	45, 782	43, 706	37, 659	31, 548	28, 253	20, 349	18, 619	347, 240
1926	19, 519	19, 984	25, 216	29, 221	38, 598	46, 320	40, 164	33, 239	28, 809	23, 164	16, 386	15, 295	335, 915
1927	16, 660	17, 085	21, 318	24, 533	34, 704	41, 489	38, 195	31, 944	25, 783	23, 012	16, 717	16, 337	307, 777
1928	18, 010	19, 005	23, 451	28, 221	37, 324	45, 012	40, 072	34, 229	30, 342	25, 134	18, 013	16, 440	335, 253
1929	19, 925	19, 522	24, 059	30, 181	42, 483	51, 702	48, 007	37, 811	30, 824	25, 961	19, 655	20, 184	370, 314
1930	23, 666	23, 031	28, 502	34, 143	48, 545	53, 887	45, 582	33, 555	26, 705	23, 581	18, 781	18, 838	378, 816

Bureau of Agricultural Economics. The 1929 and 1930 statistics are the most complete since these reports were inaugurated in 1918. Some allowance, therefore, should be made for this when comparing 1929 and 930 production with that of previous years.

TABLE 412.—*Cheese, whole-milk American Cheddar: Production, United States, by States, 1921–1930*

State	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
	1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
Vermont	1,380	954	1,200	1,755	1,120	1,114	629	603	713	1,399
Other New England States	79	------	------	34	6	128	96	147	75	85
New England	1,459	954	1,200	1,789	1,126	1,242	725	750	788	1,484
New York	37,970	47,726	37,448	36,608	38,401	31,663	24,931	31,075	26,072	29,219
New Jersey	------	634	196	155	------	------	------	------	------	307
Pennsylvania	3,208	2,209	2,497	1,750	1,349	1,681	1,750	2,196	1,240	1,749
Middle Atlantic	41,178	50,569	40,141	38,513	39,750	33,344	26,681	33,271	27,312	31,275
Ohio	654	195	128	366	253	269	303	936	1,114	1,000
Indiana	117	62	78	306	198	234	701	4,969	8,903	11,243
Illinois	1,751	2,401	2,875	2,498	2,444	2,902	2,836	4,115	6,016	5,132
Michigan	5,064	3,657	4,342	5,867	5,844	6,827	5,906	7,724	8,619	6,476
Wisconsin	182,777	193,376	226,916	235,186	258,684	248,059	227,447	221,775	242,269	246,686
North Central, East	190,363	199,691	234,339	244,223	267,423	258,291	237,193	239,519	266,921	270,537
Minnesota	5,693	5,291	7,229	9,790	8,419	8,984	7,556	9,163	10,979	9,086
Iowa	313	344	361	530	501	383	410	661	991	894
Missouri	382	96	224	105	252	312	484	2,377	4,442	3,248
Others	141	190	186	354	477	912	1,301	4,973	6,571	7,481
North Central, West	6,529	5,921	8,000	10,779	9,649	10,591	9,751	17,174	22,983	20,709
South Atlantic	184	226	277	276	155	110	164	754	1,365	858
Tennessee	50	71	284	398	321	172	154	650	2,458	2,518
Others	29	------	51	------	37	------	15	3,605	6,841	6,378
South Central, East	79	71	335	398	358	172	169	4,255	9,299	8,896
South Central, West	15	51	------	37	------	5	------	1,433	3,329	4,203
Wyoming	1,543	3,416	1,791	1,883	1,923	2,118	2,067	2,185	2,231	2,519
Idaho	2,117	3,368	5,311	7,343	7,320	7,986	7,434	7,718	7,327	8,301
Utah	1,027	3,219	2,139	2,162	1,753	1,809	2,205	2,592	2,794	2,904
Montana	113	259	641	792	1,296	1,484	1,435	2,347	1,873	1,567
Others	529	187	318	701	482	650	1,390	3,101	3,111	2,944
Mountain	5,329	10,449	10,200	12,881	12,774	14,047	14,531	17,943	17,336	18,235
Washington	1,910	2,928	2,762	2,998	3,076	3,130	2,924	4,051	4,456	4,945
Oregon	8,777	8,720	7,678	9,951	9,903	11,517	11,435	11,051	12,580	14,727
California	5,904	3,226	3,082	2,850	3,026	3,466	4,204	5,052	3,945	2,947
Pacific	16,591	14,874	13,522	15,799	16,005	18,113	18,563	20,154	20,981	22,619
Total	261,727	282,806	308,014	324,695	347,240	335,915	307,777	335,253	370,314	378,816

Bureau of Agricultural Economics. The compilations are made from reports of factories to the bureau. The 1929 and 1930 statistics are the most complete since these reports were inaugurated in 1918. Some allowance, therefore, should be made for this when comparing 1929 and 1930 production with that of previous years.

TABLE 413.—*Cheese: Receipts, gross weight,*[1] *at five markets, by months, specified years*

Market and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
New York:													
1929	3, 725	3, 854	4, 066	3, 095	4, 576	5, 218	5, 588	5, 074	4, 534	3, 858	3, 502	3, 821	50, 911
1930	4, 094	4, 212	3, 660	3, 977	4, 934	6, 247	4, 956	4, 368	4, 661	3, 881	3, 676	3, 499	52, 165
1931	4, 183	3, 887	4, 395	3, 889	4, 315	7, 099	5, 083	5, 281	4, 545	5, 409	4, 207	3, 712	56, 005
Chicago:													
1929	7, 262	7, 134	5, 511	5, 619	7, 972	8, 257	9, 048	8, 542	6, 641	6, 053	4, 585	4, 199	80, 823
1930	5, 378	4, 949	5, 066	5, 001	5, 586	5, 702	5, 980	5, 577	4, 906	4, 024	3, 491	3, 206	58, 866
1931	4, 163	3, 087	3, 656	3, 396	3, 220	3, 898	4, 380	4, 153	3, 007	3, 307	2, 932	2, 356	41, 555
Philadelphia:													
1929	1, 220	1, 198	1, 190	1, 602	1, 957	1, 616	2, 265	1, 786	2, 023	2, 105	1, 840	1, 171	19, 973
930	1, 214	1, 295	1, 927	1, 461	1, 929	2, 268	2, 279	1, 709	2, 214	1, 790	1, 542	1, 539	21, 167
1931	1, 307	1, 538	1, 639	1, 564	1, 935	2, 530	1, 707	2, 225	1, 791	2, 045	1, 334	1, 334	20, 949
Boston:													
1929	639	978	709	997	1, 232	1, 978	2, 363	1, 837	1, 108	1, 222	917	919	14, 899
1930	922	1, 189	1, 111	1, 220	1, 330	2, 097	1, 894	1, 764	1, 642	1, 542	1, 178	993	16, 882
1931	1, 213	1, 144	1, 155	1, 438	1, 432	2, 427	1, 552	1, 404	1, 734	1, 673	1, 116	952	17, 240
San Francisco:													
1929	935	713	785	1, 018	1, 013	1, 337	1, 284	1, 366	983	1, 105	985	769	12, 293
1930	918	821	1, 140	1, 367	1, 694	1, 581	2, 326	1, 535	1, 087	988	896	766	15, 119
1931	734	750	872	1, 158	1, 243	1, 526	1, 468	1, 201	871	1, 154	980	950	12, 907
Total:													
1921	11, 488	11, 283	12, 758	13, 952	19, 361	21, 680	19, 324	15, 999	14, 923	16, 653	13, 228	10, 973	181, 622
1922	10, 734	11, 258	14, 789	15, 565	19, 146	22, 770	20, 211	19, 806	17, 463	18, 323	15, 699	14, 071	199, 835
1923	13, 063	12, 617	15, 354	16, 433	18, 963	25, 406	25, 764	21, 680	18, 619	21, 326	16, 557	13, 256	219, 037
1924	13, 899	16, 092	16, 540	16, 175	19, 030	22, 041	25, 143	19, 996	18, 855	17, 479	14, 884	14, 922	215, 056
1925	15, 202	12, 845	14, 898	15, 436	18, 529	24, 025	25, 825	24, 176	20, 520	21, 029	17, 059	14, 012	223, 556
1926	14, 853	13, 568	15, 055	15, 531	14, 972	21, 777	21, 973	20, 736	18, 784	18, 699	15, 954	15, 986	207, 888
1927	12, 707	14, 916	14, 956	16, 922	21, 301	22, 134	24, 134	22, 556	21, 522	18, 996	14, 278	13, 826	218, 248
1928	14, 409	13, 715	14, 654	15, 139	16, 253	19, 216	21, 741	18, 728	18, 222	18, 665	14, 179	11, 692	196, 613
1929	13, 781	13, 877	12, 261	12, 331	16, 750	18, 406	20, 548	18, 605	15, 289	14, 343	11, 829	10, 879	178, 899
1930	12, 526	12, 466	12, 904	13, 026	15, 473	17, 895	17, 435	14, 953	14, 510	12, 225	10, 783	10, 003	164, 199
1931	11, 600	10, 406	11, 717	11, 445	12, 145	17, 480	14, 190	14, 264	11, 948	13, 588	10, 569	9, 304	148, 656

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets. See 1927 Yearbook, p. 1084, and 1931 Yearbook, p. 924 for data for earlier years.

[1] Gross weight includes container and wrapping.

TABLE 414.—*Cheese, American, and all varieties: Cold-storage holdings,*[1] *United States, 1922–1931*

AMERICAN [2]

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
	1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
1922	27, 691	21, 430	15, 006	10, 745	10, 868	15, 481	33, 130	46, 580	53, 625	49, 473	40, 852	37, 291
1923	33, 617	26, 593	20, 693	14, 465	14, 077	17, 507	36, 834	55, 839	63, 960	62, 384	57, 927	55, 105
1924	49, 566	40, 506	35, 160	28, 294	26, 202	27, 172	45, 239	65, 864	76, 406	73, 153	67, 905	58, 705
1925	49, 187	41, 552	34, 647	27, 716	26, 147	29, 550	46, 468	66, 634	76, 512	78, 582	71, 913	66, 495
1926	58, 457	50, 339	42, 587	38, 041	35, 597	39, 346	54, 069	73, 681	81, 297	77, 646	72, 491	63, 881
1927	56, 758	48, 106	41, 383	37, 188	34, 332	37, 710	52, 085	69, 119	71, 825	67, 402	60, 766	55, 140
1928	49, 914	43, 837	38, 189	33, 294	32, 177	39, 203	56, 386	75, 862	86, 632	84, 745	85, 126	77, 258
1929	71, 177	60, 772	52, 665	48, 175	44, 983	50, 721	66, 640	83, 914	90, 863	89, 797	83, 737	76, 669
1930	68, 930	58, 972	53, 208	46, 507	43, 239	53, 403	74, 986	93, 773	92, 063	90, 152	83, 674	75, 736
1931	67, 599	58, 516	52, 304	45, 277	44, 792	46, 764	63, 156	73, 693	73, 740	70, 940	69, 611	66, 053

ALL VARIETIES

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
1922	41, 594	33, 001	25, 477	19, 339	18, 980	24, 070	43, 542	57, 763	66, 875	62, 923	53, 815	48, 620
1923	45, 234	37, 228	29, 516	21, 815	21, 192	26, 235	48, 728	70, 860	80, 663	78, 791	74, 302	72, 623
1924	67, 221	57, 232	50, 388	42, 413	40, 235	42, 644	61, 755	84, 073	95, 211	91, 282	88, 043	77, 594
1925	67, 558	58, 461	50, 117	40, 480	39, 037	42, 888	61, 992	83, 568	95, 472	97, 777	90, 866	84, 561
1926	76, 649	67, 531	58, 175	51, 285	47, 450	52, 167	68, 771	90, 053	98, 473	95, 385	89, 785	81, 084
1927	74, 217	64, 216	56, 073	49, 835	47, 461	52, 748	69, 302	89, 965	92, 280	87, 080	79, 334	72, 428
1928	66, 184	57, 906	50, 263	44, 710	43, 761	51, 477	71, 353	92, 482	104, 224	101, 251	100, 229	92, 903
1929	88, 832	77, 024	67, 087	61, 223	57, 569	64, 177	83, 627	102, 077	110, 314	107, 831	100, 558	92, 553
1930	86, 075	74, 523	67, 281	59, 928	56, 940	72, 358	95, 221	113, 923	112, 061	108, 767	101, 148	91, 775
1931	83, 288	73, 488	66, 177	57, 711	57, 422	60, 242	77, 989	89, 264	91, 284	88, 564	87, 386	84, 035

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments. Changes in these tables made due to transferrence of current trading stocks to cold storage stocks from January 1, 1927, to December 1, 1931.

[1] Quantities given are net weight.

[2] The term "American cheese" is intended to cover only those varieties known as twins, flats, daisies, Cheddars, longhorns, and square prints. It does not, therefore, include all kinds of cheese made in America

TABLE 415.—*Cheese: Receipts, gross weight,[1] at five markets, by State of origin, 1927–1931*

Market and origin	1927	1928	1929	1930	1931
	1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
NEW YORK					
Ill	7,231	5,132	4,497	6,145	7,288
Ind	3,833	1,923	1,585	1,084	1,539
Iowa	421	178	82	84	26
Mass	189	64	365	93	68
Mich	440	837	937	844	704
Minn	279	179	188	329	266
Mo	287	123	7	13	30
Nebr	150	42	52	45	115
N. J	204	186	69	69	8
N. Y	11,867	13,390	11,252	10,866	8,294
Ohio	587	646	678	617	576
Pa	434	745	588	466	146
Vt	3	16	33	43	(2)
Va	3	24	220	1	(2)
Wis	19,258	23,002	27,068	28,835	35,456
Other States	280	248	372	204	78
Canada	1,471	1,537	2,918	2,427	1,411
Total	46,937	48,272	50,911	52,165	56,005
BOSTON					
Ill	3,261	1,845	1,754	1,387	1,404
Ind	170	388	161	382	348
Me	143	147	1	(2)	(2)
Mass	41	65	37	38	25
Mich	200	422	322	132	396
N. H	2	2	1	5	1
N. Y	2,831	3,787	2,847	2,349	2,310
Ohio	196	110	6	12	76
Pa	197	56	10	60	1
Vt	124	47	34	113	54
Wis	7,170	9,953	9,260	9,492	11,746
Other States	221	353	407	2,910	876
Canada	32	187	59	2	3
Total	14,588	17,362	14,899	16,882	17,240
PHILADELPHIA					
Ill	3,704	2,701	3,075	2,091	1,880
Ind	115	110	137	34	146
Iowa	3	2	4	4	3
Mich	634	499	539	655	668
Minn	416	343	23	34	285
N. Y	2,462	2,201	2,145	2,231	1,688
Ohio	86	82	52	1	10
PHILADELPHIA—con.					
Pa	41	4	57	91	87
Wis	12,723	14,735	13,825	15,966	15,945
Other States	86	196	41	60	237
Canada	126	166	75	----	----
Total	20,396	21,039	19,973	21,167	20,949
CHICAGO					
Calif	3	45	56	37	45
Colo	31	58	197	22	12
Ill	2,996	2,900	1,994	1,853	943
Ind	43	255	296	396	139
Iowa	263	296	278	98	76
Kans	26	36	35	39	27
Mich	550	137	192	246	49
Minn	2,503	2,979	2,999	1,751	1,132
Mo	122	583	181	24	20
Mont	66	----	1	10	1
N. J	41	445	780	319	879
N. Y	3,489	4,246	4,652	2,857	1,323
Ohio	532	176	111	136	9
Pa	532	479	230	60	23
S. Dak	138	9	29	16	28
Tex	12	15	6	5	59
Wis	109,504	82,954	67,495	49,447	36,424
Other States	1,040	1,084	685	683	333
Canada	1,742	567	606	867	33
Total	123,633	97,264	80,823	58,866	41,555
SAN FRANCISCO					
Calif	2,515	3,508	3,449	4,213	3,110
Colo	241	225	179	165	129
Idaho	3,331	3,334	3,303	3,413	2,907
Ill	192	91	3	221	(2)
Mont	1	160	3	1	----
N. Y	596	572	734	784	687
Oreg	3,273	2,877	3,374	5,427	5,093
Utah	199	30	59	28	----
Wash	91	17	17	13	34
Wis	2,198	1,820	1,136	759	904
Other States	57	42	36	95	43
Total	12,694	12,676	12,293	15,119	12,907

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets.

[1] Gross weight includes container and wrapping. [2] Not over 500 pounds.

TABLE 416.—*Cheese, No. 1 American, fresh single daisies: Average wholesale price per pound, New York, by months, 1924–1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1924	24	24	23	20	19	20	20	21	21	21	21	22	21
1925	24	24	24	24	24	24	24	24	24	25	[1] 25	25	24
1926	26	25	23	21	21	21	22	22	23	24	25	26	23
1927	26	26	25	24	24	24	24	25	27	28	27	29	26
1928	----	[1] 25	25	24	24	26	26	26	27	26	25	25	[2] 25
1929	25	24	24	24	23	23	23	23	24	24	24	23	24
1930	21	21	21	21	20	18	18	19	20	19	19	18	20
1931	17	16	16	15	14	14	15	16	17	16	15	14	15

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the market. These wholesale prices are based upon open market sales made for cash or short-time credit, consideration being given to the prices at which the larger quantities are sold.

[1] Less than 10 quotations during month. [2] Based on 11 months' quotations.

TABLE 417.—*Cheese: International trade, average 1925–1929, annual 1927–1930*

Country	Calendar year									
	Average 1925–1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIAPL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Netherlands	198, 043	1, 292	214, 565	1, 284	202, 999	1, 484	211, 234	1, 445	206, 735	1, 509
New Zealand	171, 975	4	167, 193	7	175, 534	1	199, 258	6	203, 054	6
Canada	120, 606	3, 419	110, 533	1, 721	114, 152	1, 779	92, 946	2, 104	80, 164	1, 788
Italy	76, 304	9, 818	70, 078	13, 123	80, 466	10, 206	71, 802	13, 975	80, 974	12, 562
Switzerland	64, 236	3, 538	75, 059	3, 638	62, 695	3, 396	69, 726	3, 437	66, 143	4, 238
Denmark	14, 740	971	11, 644	1, 102	13, 417	863	14, 513	647	12, 626	810
Czechoslovakia	7, 843	2, 450	8, 463	2, 534	7, 922	2, 625	7, 052	3, 348	8, 276	2, 963
Australia [2]	6, 724	1, 212	4, 813	2, 097	9, 262	1, 007	5, 131	548	------	------
Finland	5, 951	42	6, 502	34	3, 634	39	4, 836	44	4, 682	------
Yugoslavia	4, 787	318	5, 826	389	4, 132	325	4, 937	370	4, 583	297
Bulgaria	2, 150	18	5, 790	19	1, 932	15	2, 642	11	2, 465	------
Hungary	1, 870	1, 720	2, 609	1, 733	1, 398	1, 782	1, 703	1, 536	1, 846	945
Russia [2]	[3] 645	[3] 184	1, 847	133	------	------	------	------	------	------
Total	675, 874	24, 986	684, 922	27, 814	677, 543	23, 522	685, 780	27, 471	671, 548	25, 118
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom	4, 509	331, 101	5, 363	325, 891	5, 852	333, 182	6, 388	331, 744	5, 579	345, 227
Germany	3, 311	149, 025	3, 160	158, 740	3, 664	135, 530	4, 919	146, 569	5, 411	137, 458
United States	4, 350	75, 680	3, 410	79, 796	2, 600	81, 403	2, 645	76, 382	1, 964	68, 311
Belgium	1, 174	38, 720	1, 001	36, 538	914	39, 148	899	46, 455	875	51, 106
France	32, 557	38, 671	25, 595	36, 856	35, 122	36, 694	40, 608	51, 070	38, 921	65, 523
Algeria	220	7, 501	210	6, 849	185	8, 821	193	8, 474	212	10, 398
Spain	89	7, 109	73	7, 576	91	8, 667	67	6, 970	207	5, 835
Austria	1, 769	7, 056	1, 387	7, 553	2, 461	6, 401	2, 936	5, 716	4, 494	5, 636
Egypt	152	6, 870	176	6, 740	155	7, 085	195	6, 526	121	7, 494
Cuba	5	4, 764	3	5, 210	12	4, 163	6	4, 484	10	2, 867
Greece	40	3, 942	[2] 4	9, 735	21	2, 298	[2] 178	3, 314	------	2, 301
Argentina	862	3, 681	1, 224	3, 228	764	4, 344	796	4, 000	744	3, 777
Irish Free State	271	2, 567	212	2, 414	133	2, 449	123	2, 409	------	2, 350
Dutch East Indies	0	1, 881	0	1, 997	0	1, 938	0	2, 346	0	2, 161
Mexico	[4] 124	1, 808	130	1, 548	125	1, 714	------	1, 744	------	1, 230
Brazil	0	1, 472	0	1, 395	0	1, 763	0	1, 555	0	1, 246
Sweden	474	1, 405	574	1, 522	145	1, 501	263	1, 413	550	1, 473
Tunis	21	1, 347	14	1, 313	46	1, 430	13	1, 683	28	1, 764
British India	6	1, 231	4	1, 332	6	1, 218	7	1, 257	7	1, 148
Norway	925	1, 191	894	1, 452	927	1, 094	1, 347	841	1, 380	749
Union of South Africa	342	530	431	537	298	734	404	669	1, 954	450
Total	51, 201	687, 552	43, 865	698, 222	53, 521	681, 577	61, 987	705, 621	62, 457	718, 504

Bureau of Agricultural Economics. Official sources except where otherwise noted. All cheese made from milk, including "cottage cheese."

[1] Preliminary.
[2] International Yearbook of Agricultural Statistics.
[3] 3-year average.
[4] 4-year average.

TABLE 418.—*Oleomargarine, standard, uncolored: Average wholesale price per pound, Chicago, by months, 1922–1931* [1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Ceets*	*Cents*
1922	19. 0	17. 5	17. 5	17. 5	17. 5	17. 5	18. 2	18. 5	18. 5	18. 5	19. 2	20. 5	18. 3
1923	20. 5	20. 5	20. 5	20. 5	20. 5	20. 5	20. 5	20. 5	21. 0	21. 5	22. 2	22. 5	20. 9
1924	22. 5	22. 5	21. 9	20. 5	20. 5	20. 5	21. 2	22. 5	22. 5	23. 0	24. 0	24. 5	22. 2
1925	24. 5	24. 5	24. 5	24. 5	23. 9	23. 5	23. 7	24. 5	24. 5	24. 5	24. 5	24. 5	24. 3
1926	24. 5	24. 3	23. 5	23. 3	22. 5	22. 5	22. 5	22. 5	22. 5	22. 5	21. 8	21. 5	22. 8
1927	21. 5	21. 5	21. 5	21. 5	21. 5	21. 5	21. 5	21. 5	23. 9	24. 5	23. 5	23. 5	22. 3
1928	23. 5	23. 5	23. 5	21. 5	21. 5	21. 5	21. 5	21. 5	22. 0	23. 5	23. 5	23. 5	22. 5
1929	23. 5	23. 5	23. 5	23. 5	23. 5	23. 5	23. 5	23. 5	23. 5	23. 5	23. 5	23. 5	23. 5
1930	23. 5	23. 5	23. 5	23. 5	23. 5	22. 8	20. 5	20. 5	20. 5	20. 5	20. 5	19. 0	21. 8
1931	17. 7	15. 5	14. 5	14. 5	12. 8	11. 0	10. 6	10. 5	11. 9	12. 7	13. 3	13. 4	13. 3

Bureau of Agricultural Economics. Compiled from Bureau of Labor Statistics Wholesale Price Bulletins.

[1] These prices are for consignment to the wholesale trade.

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TABLE 419.—*Oleomargarine: Materials used in manufacture, 1921–22 to 1930–31*

Material	Year beginning July—									
	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Butter	1,107	1,576	1,900	1,509	2,330	2,070	2,484	2,611	2,616	1,013
Coconut oil	57,394	65,656	83,059	79,449	98,307	107,654	141,000	171,412	185,066	155,954
Coloring	11	11	26	38	41	18	19	47	21	11
Corn oil			457	196	174	183	38		(1)	159
Cottonseed oil	15,420	18,757	20,640	20,966	25,608	23,372	24,801	28,173	30,214	22,037
Edible tallow			24	111	93	219	70	26	16	(1)
Milk	53,939	59,835	69,090	61,924	72,662	73,700	83,115	94,752	97,753	77,251
Mustard-seed oil			38	27	34	53	56	12	48	48
Neutral lard	27,057	29,568	32,210	25,674	25,172	24,872	25,036	24,189	19,632	10,180
Oleo oil	40,980	46,645	52,265	44,102	47,418	48,741	45,477	47,185	45,322	28,040
Oleo stearine	4,574	4,815	5,317	5,250	5,314	5,145	5,532	5,834	6,269	5,485
Oleo stock	2,143	2,322	2,756	3,183	3,082	2,552	1,738	1,294	1,189	1,025
Peanut oil	11,625	6,922	5,656	4,392	5,257	4,872	5,459	6,617	5,714	5,291
Salt	16,262	17,998	20,593	18,725	20,593	21,683	25,024	27,311	28,890	22,981
Soybean oil					1	33			619	2,262
Miscellaneous	3,417	2,918	432	688	1,374	918	1,220	1,474	1,279	3,154
Total	233,929	257,023	294,463	266,234	307,460	316,085	361,069	410,937	424,648	334,891

Bureau of Agricultural Economics. Compiled from annual reports of the Bureau of Internal Revenue.

[1] Not over 500 pounds.

TABLE 420.—*Oleomargarine: Production and apparent consumption in the United States, 1924–25 to 1930–31*

Year beginning July—	Production			Stocks beginning of year	Exports	Stocks end of year	Apparent consumption	
	Colored	Uncolored	Total				Total	Per capita
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*Pounds*
1924–25	11,280	204,123	215,403	2,607	887	2,720	214,403	1.87
1925–26	13,181	234,866	248,047	2,720	1,256	2,942	246,569	2.12
1926–27	14,502	242,655	257,157	2,942	942	3,299	255,858	2.17
1927–28	15,351	279,348	294,699	3,299	732	3,187	294,079	2.46
1928–29	16,306	316,816	333,122	3,187	633	4,191	331,485	2.74
1929–30	17,103	332,021	349,124	4,191	931	4,702	347,682	2.84
1930–31	8,847	268,926	277,773	4,694	604	2,494	279,369	2.26

Bureau of Agricultural Economics. Production and stocks from reports of the Bureau of Internal Revenue. Exports from reports of the Bureau of Foreign and Domestic Commerce. See 1927 Yearbook, p.1088, for data for earlier years.

TABLE 421.—*Chickens: Number on hand, January 1 and value in the United States, 1920–1931*

Year	Chickens on hand Jan. 1			Year	Chickens on hand Jan. 1		
	Number of fowls	Price per head	Total value		Number of fowls	Price per head	Total value
	Thousands	*Cents*	*1,000 dollars*		*Thousands*	*Cents*	*1,000 dollars*
1920 (census)	359,537	97.21	349,509	1926	424,227	88.61	375,900
1921	356,168	89.30	318,058	1927	448,665	91.07	408,619
1922	396,507	80.77	320,259	1928	463,364	86.07	398,838
1923	411,469	74.61	306,998	1929	444,481	91.30	405,798
1924	449,188	76.09	341,765	1930	470,463	93.15	438,220
1925	417,755	79.20	330,871	1931	459,402	70.49	323,849

Bureau of Agricultural Economics.

TABLE 422.—*Chickens: Estimated number and value per head on farms January 1, 1925–1931*

State and division	Number chickens Jan. 1							Value per head						
	1925	1926	1927	1928	1929	1930	1931	1925	1926	1927	1928	1929	1930	1931
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
Maine	1,957	1,957	1,898	2,020	1,908	2,051	2.159	125	132	132	136	140	155	125
New Hampshire	1,267	1,267	1,242	1,336	1,271	1,381	1,295	140	148	153	150	150	160	130
Vermont	970	970	999	1,040	978	1,095	1,064	122	130	132	130	130	140	115
Massachusetts	2,030	2,030	1,949	2,027	1,991	2,152	2,085	150	165	155	160	160	170	140
Rhode Island	361	361	383	412	391	416	382	160	170	160	160	157	175	135
Connecticut	1,699	1,784	1,820	1,961	2,059	2,221	2,197	145	155	150	155	155	165	120
New York	13,945	13,945	14,224	14,366	13,980	14,621	14,588	112	121	120	117	123	126	103
New Jersey	4,196	4,322	4,538	4,674	4,628	5,115	4,496	140	149	146	130	145	148	125
Pennsylvania	17,652	18,181	19,111	19,875	19,034	20,818	20,315	108	115	115	114	121	128	98
North Atlantic	44,077	44,817	46,164	47,711	46,240	49,870	48,617	118.16	126.45	125.12	122.80	129.27	135.58	107.51
Ohio	21,345	22,643	23,549	23,887	23,185	24,954	24,878	89	100	100	93	97	101	75
Indiana	17,710	17,356	18,310	17,821	17,331	18,735	18,013	82	94	95	89	95	97	71
Illinois	25,995	26,514	27,575	27,479	27,148	28,758	26,824	85	96	96	91	101	101	73
Michigan	12,956	13,605	14,422	15,143	14,503	14,952	14,967	90	96	98	92	103	105	81
Wisconsin	13,283	13,814	14,919	14,799	14,467	15,322	15,877	80	88	91	88	95	97	72
North Central, East	91,289	93,932	98,775	99,129	96,634	102,721	100,559	85.33	95.42	96.30	90.83	98.36	100.26	74.17
Minnesota	16,736	17,087	17,276	16,789	17,411	18,627	17,783	70	77	80	73	79	80	63
Iowa	30,275	31,183	31,806	32,340	32,005	34,713	34,050	78	89	90	84	90	85	66
Missouri	28,786	29,937	31,733	31,733	30,603	32,308	30,408	70	81	85	85	88	86	60
North Dakota	5,233	5,442	5,263	5,158	5,322	5,669	5,389	58	70	71	70	77	70	52
South Dakota	7,985	8,065	8,226	8,449	8,472	9,087	8,923	62	73	82	74	83	74	57
Nebraska	13,635	13,090	13,613	13,787	13,471	14,803	14,773	58	74	80	75	84	78	57
Kansas	21,825	21,389	22,030	22,372	22,409	23,596	23,139	63	77	83	75	81	80	54
North Central, West	124,475	126,193	129,947	130,628	129,693	138,803	134,465	68.39	80.05	83.94	79.14	84.88	81.63	60.03
North Central	215,764	220,125	228,722	229,757	226,327	241,524	235,024	75.56	86.61	89.28	84.18	91.59	89.55	66.08
Delaware	1,392	1,392	1,434	1,462	1,389	1,492	1,454	100	115	120	105	109	115	90
Maryland	4,324	4,454	4,721	4,762	4,511	4,728	4,723	95	113	112	100	104	112	90
Virginia	9,406	9,594	10,361	10,896	9,879	10,543	10,214	83	90	92	91	95	99	72
West Virginia	4,436	4,436	4,569	4,747	4,643	4,876	4,706	83	95	92	90	92	97	71
North Carolina	8,900	8,900	9,345	10,116	8,675	8,769	8,634	78	80	81	81	82	85	70
South Carolina	4,365	4,103	4,513	4,827	4,138	4,159	4,167	73	73	78	73	72	77	71

TABLE 422.—*Chickens: Estimated number and value per head on farms January 1, 1925–1931*—Continued

State and division	Number chickens Jan. 1							Value per head						
	1925	1926	1927	1928	1929	1930	1931	1925	1926	1927	1928	1929	1930	1931
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
Georgia	7, 254	7, 066	7, 632	8, 245	7, 054	7, 233	7, 355	75	74	76	71	72	76	64
Florida	2, 194	2, 150	2, 448	2, 667	2, 294	2, 530	2, 569	95	105	100	85	87	88	85
South Atlantic	42, 271	42, 095	45, 023	47, 722	42, 583	44, 330	43, 827	81. 95	88. 10	89. 02	84. 50	86. 96	91. 49	73. 37
Kentucky	11, 257	11, 483	12, 401	12, 539	11, 063	11, 790	11, 039	69	74	80	77	82	88	60
Tennessee	12, 217	12, 584	13, 339	14, 156	12, 712	12, 821	12, 077	68	73	77	73	75	81	57
Alabama	6, 473	6, 473	6, 862	7, 090	6, 237	6, 655	6, 601	65	67	70	67	70	76	54
Mississippi	6, 135	6, 503	7, 023	7, 171	6, 584	6, 909	6, 590	70	70	71	70	72	80	57
Arkansas	7, 522	7, 898	8, 530	8, 871	8, 401	8, 748	6, 998	58	67	67	62	68	70	47
Louisiana	4, 063	4, 063	4, 724	4, 289	4, 307	4, 678	4, 380	67	77	76	77	81	85	63
Oklahoma	13, 283	13, 626	15, 107	15, 561	15, 457	15, 853	14, 653	63	74	80	73	78	75	54
Texas	20, 136	18, 525	21, 139	24, 124	22, 673	23, 574	23, 576	64	69	72	67	67	73	56
South Central	81, 086	81, 155	89, 125	93, 801	87, 434	91, 028	85, 914	65. 26	71. 29	74. 72	70. 45	73. 38	77. 49	55. 86
Montana	2, 545	2, 596	2, 466	2, 676	2, 863	2, 713	2, 690	70	71	80	83	84	80	60
Idaho	2, 090	2, 194	2, 414	2, 562	2, 728	2, 662	2, 789	61	70	75	73	79	84	62
Wyoming	809	793	828	953	930	971	948	70	73	80	80	82	88	68
Colorado	3, 752	3, 902	4, 214	4, 288	4, 502	4, 872	4, 722	67	73	78	74	75	79	63
New Mexico	965	888	977	1, 119	1, 101	1, 156	1, 128	68	75	81	74	76	77	62
Arizona	655	720	864	735	676	676	712	90	100	95	95	100	105	86
Utah	1, 436	1, 405	1, 642	1, 806	1, 940	2, 412	2, 849	66	76	75	75	81	87	70
Nevada	234	251	271	288	286	291	291	77	90	90	95	100	110	90
Washington	5, 577	6, 134	7, 054	8, 313	7, 572	8, 037	8, 751	80	95	105	90	95	99	70
Oregon	3, 326	3, 326	3, 692	4, 291	4, 049	3, 903	4, 073	93	94	95	91	94	99	80
California	13, 168	13, 826	15, 209	17, 342	15, 250	16, 018	17, 067	95	110	120	103	109	114	95
Far Western	34, 557	36, 035	39, 631	44, 373	41, 897	43, 711	46, 020	81. 73	93. 38	100. 89	91. 11	94. 73	98. 85	78. 50
United States	417, 755	424, 227	448, 665	463, 364	444, 481	470, 463	459, 402	79. 20	88. 61	91. 07	86. 07	91. 30	93. 15	70. 49

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TABLE 423.—*Eggs: Annual layings per flock on farms of crop correspondents, by States, 1925–1931* [1]

State and division	1925	1926	1927	1928	1929	1930	1931
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Maine	8, 518	8, 317	8, 287	8, 567	8, 685	9, 868	9, 953
New Hampshire	9, 479	7, 944	8, 594	9, 248	9, 290	9, 077	9, 494
Vermont	6, 272	6, 293	6, 344	6, 786	6, 685	7, 384	7, 366
Massachusetts	9, 384	10, 160	9, 436	11, 004	10, 707	11, 634	11, 911
Rhode Island	10, 534	10, 108	10, 588	11, 215	9, 536	11, 856	11, 987
Connecticut	8, 740	9, 819	10, 749	10, 965	11, 345	11, 643	12, 260
New York	10, 117	10, 065	10, 512	10, 404	11, 078	11, 050	11, 354
New Jersey	11, 889	12, 193	12, 291	12, 017	12, 294	12, 339	13, 075
Pennsylvania	11, 403	12, 114	12, 619	12, 209	12, 589	12, 920	13, 346
North Atlantic	10, 283	10, 543	10, 946	10, 880	11, 253	11, 567	11, 951
Ohio	11, 987	12, 656	13, 221	12, 770	12, 890	13, 701	13, 911
Indiana	12, 102	12, 537	12, 938	12, 596	12, 643	12, 756	13, 029
Illinois	11, 734	12, 230	12, 470	12, 044	12, 099	12, 333	12, 431
Michigan	8, 959	9, 594	10, 084	10, 251	10, 008	10, 345	10, 841
Wisconsin	9, 004	9, 631	10, 163	10, 477	10, 777	11, 455	12, 078
Minnesota	10, 251	10, 245	10, 251	10, 352	10, 579	11, 391	11, 683
Iowa	13, 434	14, 683	14, 689	14, 792	14, 632	15, 382	14, 850
Missouri	13, 005	14, 285	14, 489	13, 932	13, 510	14, 075	14, 279
North Dakota	7, 652	7, 889	7, 448	7, 570	7, 320	7, 348	7, 430
South Dakota	10, 379	10, 704	10, 798	11, 328	11, 476	12, 382	11, 972
Nebraska	10, 759	11, 473	11, 412	11, 736	11, 737	12, 750	12, 576
Kansas	14, 160	14, 917	15, 218	15, 223	15, 249	15, 559	16, 212
North Central	11, 462	12, 141	12, 379	12, 303	12, 284	12, 822	13, 021
Delaware	16, 696	17, 568	19, 660	19, 615	16, 541	14, 604	13, 093
Maryland	11, 692	12, 637	13, 659	12, 349	12, 795	12, 066	11, 984
Virginia	7, 977	8, 287	9, 032	8, 506	8, 442	8, 254	8, 594
West Virginia	8, 576	8, 682	8, 801	8, 882	8, 190	8, 579	8, 460
North Carolina	5, 782	5, 819	6, 372	6, 314	5, 560	5, 208	5, 512
South Carolina	4, 976	5, 338	5, 840	5, 612	5, 083	5, 241	5, 366
Georgia	5, 432	5, 399	5, 530	5, 484	4, 894	4, 776	4, 709
Florida	7, 372	7, 640	8, 023	7, 247	7, 320	6, 901	7, 162
South Atlantic	6, 678	6, 894	7, 334	7, 113	6, 618	6, 489	6, 504
Kentucky	6, 843	7, 408	8, 311	6, 945	6, 424	6, 785	6, 749
Tennessee	6, 645	7, 199	8, 035	7, 192	6, 618	6, 706	6, 624
Alabama	5, 569	5, 797	6, 120	5, 402	5, 521	5, 457	5, 533
Mississippi	5, 284	6, 095	6, 110	5, 673	5, 162	5, 019	5, 016
Arkansas	5, 578	6, 098	6, 454	6, 216	5, 983	5, 642	5, 600
Louisiana	6, 576	6, 968	6, 764	6, 396	5, 992	6, 004	5, 706
Oklahoma	9, 576	10, 962	11, 841	11, 001	10, 959	10, 698	10, 242
Texas	7, 336	7, 940	9, 345	9, 611	9, 485	9, 196	9, 488
South Central	6, 742	7, 388	8, 056	7, 529	7, 234	7, 203	7, 127
Montana	6, 822	7, 190	6, 506	7, 549	7, 247	7, 311	7, 253
Idaho	8, 378	9, 840	10, 087	11, 218	10, 886	9, 986	10, 050
Wyoming	7, 269	7, 968	7, 554	8, 391	7, 764	8, 439	8, 202
Colorado	8, 235	8, 913	8, 552	9, 510	9, 752	9, 546	9, 844
New Mexico	6, 235	6, 731	7, 314	7, 762	7, 694	7, 177	7, 944
Arizona	9, 482	9, 734	9, 764	8, 903	9, 020	9, 333	10, 087
Utah	7, 849	8, 983	9, 245	10, 080	10, 226	11, 433	11, 546
Nevada	7, 737	10, 482	9, 339	11, 926	13, 051	10, 318	11, 342
Washington	9, 865	9, 968	10, 996	10, 266	10, 607	10, 883	11, 218
Oregon	9, 153	9, 059	10, 281	10, 522	10, 579	10, 005	10, 281
California	8, 925	9, 500	9, 834	9, 507	8, 293	8, 795	9, 999
Western	8, 484	9, 050	9, 362	9, 593	9, 335	9, 223	9, 814
United States	8, 859	9, 401	9, 827	9, 608	9, 440	9, 620	9, 655

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[1] Calculated by multiplying average daily layings per flock by the number of days in the year. Daily production derived from number of eggs laid on the first day of each month, as reported for about 22,000 farm flocks.

TABLE 424.—*Poultry, live: Freight receipts, by States, at New York, 1927–1931*

State	1927	1928	1929	1930	1931
	Cars	*Cars*	*Cars*	*Cars*	*Cars*
Alabama	82	176	181	129	166
Arkansas	420	410	369	349	359
Colorado	52	89	86	82	24
Delaware				1	
Florida			2	4	3
Georgia	45	151	179	79	62
Illinois	1,227	874	880	1,174	978
Indiana	1,267	842	963	1,168	942
Iowa	856	586	354	604	732
Kansas	661	474	422	509	447
Kentucky	739	741	397	511	593
Louisiana	1	1			
Maryland				2	1
Massachusetts	1	1			
Michigan	1	6	6		
Minnesota	166	164	131	123	187
Mississippi	154	188	90	76	75
Missouri	2,147	1,896	1,874	2,019	1,650
Nebraska	996	1,078	1,156	1,082	985
New Jersey				1	
New Mexico	1	4	13	2	
New York	1	1	1		
North Carolina	91	158	240	107	63
North Dakota		33	57	55	76
Ohio	429	343	335	305	335
Oklahoma	808	873	835	763	728
Pennsylvania	58	36	44	12	8
South Carolina	29	41	125	49	59
South Dakota	187	313	273	214	300
Tennessee	975	1,060	884	642	857
Texas	365	436	348	332	233
Utah			4		
Virginia	56	68	56	91	96
Wisconsin	253	219	175	188	192
Wyoming	2	5	13	4	1
Other States	34				
United States	12,104	11,267	10,493	10,677	10,152

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TABLE 425.—*Poultry, dressed: Receipts, gross weight,*[1] *at four markets, by months, 1927–1931; totals, 1921–1931*

Market and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Boston:													
1927	4,318	3,610	2,440	2,398	3,653	3,455	2,996	3,612	3,404	4,663	8,511	10,245	53,305
1928	4,591	3,756	4,137	2,877	3,285	3,290	3,899	3,468	3,555	4,680	7,716	10,329	55,583
1929	4,586	3,231	2,315	2,855	2,718	3,369	3,153	3,628	4,309	5,048	8,826	10,395	54,433
1930	4,270	3,992	2,815	2,544	3,193	3,514	3,401	2,952	3,154	3,875	8,270	9,309	51,289
1931	4,840	4,565	3,846	2,976	2,559	3,216	3,476	3,635	3,787	4,434	9,698	10,750	57,782
New York:													
1927	12,954	8,957	8,722	7,770	11,633	13,635	12,168	14,589	15,470	17,682	31,740	32,797	188,117
1928	14,999	11,064	9,322	9,703	10,628	11,127	13,252	13,850	14,332	21,799	31,846	32,454	194,376
1929	14,221	10,900	9,964	9,520	10,233	11,876	13,078	15,707	16,558	20,602	31,495	32,903	197,057
1930	15,054	11,674	8,476	10,630	13,877	14,999	11,807	12,533	15,383	19,647	32,584	34,221	200,885
1931	17,969	13,396	9,920	10,073	10,553	13,657	15,242	18,294	21,147	18,749	33,029	36,882	218,911
Philadelphia:													
1927	2,885	2,006	2,005	1,769	1,695	1,668	1,398	1,918	2,530	2,613	4,432	6,903	31,822
1928	2,373	1,601	1,885	1,359	1,558	2,177	1,931	1,763	2,097	2,965	4,925	7,210	31,844
1929	2,548	1,851	1,680	1,471	1,557	1,663	2,134	2,319	2,302	2,542	6,002	8,595	34,664
1930	3,041	2,501	2,207	1,991	2,388	2,117	1,794	1,772	2,166	3,046	5,607	7,906	36,536
1931	2,384	2,179	2,863	1,754	1,560	2,509	2,729	2,875	2,555	2,524	6,018	8,243	38,193
Chicago:													
1927	6,495	3,546	2,195	1,835	2,872	2,257	1,227	2,257	2,531	3,752	15,739	19,029	63,735
1928	6,639	3,591	2,216	1,876	2,137	1,977	2,771	2,829	3,580	5,719	15,301	18,544	67,180
1929	7,712	3,469	2,707	2,725	2,811	3,270	3,520	3,984	4,710	9,070	25,578	23,812	93,368
1930	9,835	5,597	2,899	2,339	2,163	2,645	2,303	2,777	3,809	6,274	19,409	20,103	80,153
1931	7,770	4,529	3,563	2,320	2,309	2,501	3,130	3,673	4,642	4,397	14,203	18,438	71,475
Total:													
1921	22,659	13,634	10,860	9,837	10,402	12,325	10,136	15,463	18,150	21,645	47,259	59,986	252,356
1922	22,250	14,506	13,320	11,512	14,373	16,606	13,703	15,433	17,121	21,434	45,540	71,957	277,755
1923	43,123	22,858	16,752	12,436	13,210	16,205	16,863	17,794	18,399	28,087	56,018	73,100	334,845
1924	37,150	26,395	20,344	15,182	17,319	17,862	19,572	17,543	19,868	26,982	60,445	78,068	356,730
1925	27,585	19,383	15,048	13,323	16,166	17,487	17,676	17,466	18,683	27,259	61,488	66,794	318,358
1926	26,122	18,576	17,344	13,809	16,371	21,099	20,724	22,932	24,278	30,738	68,594	75,228	355,815
1927	26,652	18,119	15,362	13,772	19,853	21,015	17,789	22,376	23,935	28,710	60,422	68,974	336,979
1928	28,602	20,012	17,560	15,815	17,608	18,571	21,853	21,910	23,564	35,163	59,788	68,537	348,983
1929	29,067	19,451	16,666	16,571	17,319	20,178	21,885	25,638	27,879	37,262	71,901	75,705	379,522
1930	32,200	23,764	16,397	17,504	21,621	23,275	19,305	20,034	24,512	32,842	65,870	71,539	368,863
1931	32,963	24,669	20,192	17,123	16,981	21,883	24,577	28,477	32,131	30,104	62,948	74,313	386,361

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets.

[1] Gross weight includes container and wrapping.

TABLE 426.—*Poultry, dressed: Receipts, gross weight,[1] at four markets, by State of origin, 1927–1931*

Market and origin	1927	1928	1929	1930	1931
BOSTON	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
Ill	14,203	11,719	10,651	10,497	9,284
Ind	5,225	5,368	3,200	3,677	3,296
Iowa	7,003	6,648	7,609	7,495	8,917
Kans	3,592	4,557	4,917	2,155	3,774
Ky	453	204	141	365	227
Me	690	509	500	479	319
Mass	495	85	27	37	5
Mich	681	888	663	515	424
Minn	5,886	6,860	6,786	9,024	9,502
Mo	1,509	1,881	2,722	2,328	2,100
Nebr	1,930	3,298	3,163	3,950	3,763
N. H	62	17	15	25	13
N. Y	1,467	1,709	757	1,008	942
N. Dak	469	478	1,473	1,521	2,678
Ohio	533	390	140	84	254
Okla	2,066	2,662	1,364	1,215	1,369
Pa	260	104	1	21	200
S. Dak	46	114	559	377	1,541
Tenn	160	330	510	173	323
Tex	5,110	5,034	6,693	5,476	7,099
Vt	26	28	31	31	31
Wis	553	932	266	94	322
Other States	814	1,761	2,245	742	1,250
Canada	72	7	-------	-------	149
Total	53,305	55,583	54,433	51,289	57,782
NEW YORK					
Ark	78	40	442	532	337
Calif	318	1,117	1,753	1,476	1,668
Colo	315	1,180	598	1,225	891
Del	56	54	31	29	110
Idaho	244	1,656	1,730	1,122	1,612
Ill	28,356	24,864	24,393	28,182	27,594
Ind	11,585	11,624	11,480	13,637	9,671
Iowa	25,226	26,324	30,819	30,295	36,614
Kans	20,725	21,070	20,448	18,887	16,926
Ky	4,700	5,234	3,050	2,329	2,672
Md	757	346	238	283	241
Mass	425	336	347	390	113
Mich	659	2,561	1,962	1,435	2,374
Minn	10,820	13,937	12,914	21,322	24,080
Mo	19,231	19,817	19,305	16,301	13,974
Mont	202	471	315	399	450
Nebr	7,041	9,057	8,120	8,861	9,512
N. J	1,022	649	211	178	297
N. Y	16,438	14,167	12,489	14,415	23,858
N. Dak	1,028	1,236	1,841	2,099	2,783
Ohio	3,920	2,306	3,399	2,519	3,154
Okla	7,314	5,478	7,012	6,410	8,503
Oreg	148	649	766	338	747
Pa	1,332	660	524	537	801
S. Dak	3,413	3,595	4,692	5,007	6,625
Tenn	4,507	4,542	3,384	2,390	3,890
Tex	13,192	16,181	18,386	15,301	15,612
Utah	-------	-------	305	559	472
Va	2,229	2,158	2,013	1,586	722
Wash	248	190	619	383	353
Wis	1,843	1,551	934	1,304	1,103
Wyo	-------	499	372	449	510
Other States	698	780	1,115	705	600
Canada	47	47	20	-------	42
Total	188,117	194,376	197,057	200,885	218,911
CHICAGO	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
Ark	238	688	193	216	381
Calif	55	28	234	78	138
Colo	228	293	378	546	433
Idaho	120	171	551	446	84
Ill	3,893	2,581	3,411	3,521	3,376
Ind	536	559	778	801	217
Iowa	14,719	13,117	18,505	18,152	13,694
Kans	2,915	4,315	5,108	4,111	4,580
Ky	208	32	124	143	477
Mich	66	379	62	111	79
Minn	10,541	7,829	13,833	9,891	10,852
Mo	4,812	6,379	6,647	5,985	4,603
Mont	1,022	1,530	2,904	1,898	1,135
Nebr	3,247	4,295	4,169	3,875	4,273
N. J	78	304	271	-------	194
N. Mex	38	96	145	226	164
N. Y	715	661	837	455	266
N. Dak	4,769	5,933	8,502	7,616	6,826
Ohio	15	26	273	185	59
Okla	2,250	2,712	2,830	1,880	2,607
S. Dak	6,069	7,371	10,366	9,010	9,282
Tenn	377	361	483	381	393
Tex	2,577	3,302	6,930	6,268	4,459
Wis	3,982	3,409	4,811	3,135	2,310
Wyo	133	260	373	444	264
Other States	132	494	650	779	329
Canada	-------	55	-------	-------	-------
Total	63,735	67,180	93,368	80,153	71,475
PHILADELPHIA					
Colo	108	107	350	16	283
Idaho	712	688	432	592	200
Ill	4,232	1,940	1,531	2,897	3,627
Ind	4,135	3,263	2,917	1,562	1,401
Iowa	4,179	4,962	5,558	6,577	6,333
Kans	1,615	4,901	3,564	2,248	2,496
Ky	504	542	621	756	218
Md	84	106	128	82	84
Mich	102	47	45	117	266
Minn	4,475	3,062	4,190	7,595	8,707
Mo	1,168	1,249	951	1,222	1,570
Nebr	673	1,089	1,438	1,288	2,416
N. J	113	305	130	812	197
N. Y	759	683	749	442	310
N. Dak	445	620	1,140	882	793
Ohio	696	491	397	390	92
Okla	2,067	2,710	2,984	2,418	2,508
Pa	824	245	190	69	14
S. Dak	132	150	497	922	574
Tex	1,829	1,745	3,450	3,029	4,815
Va	1,458	1,097	1,166	853	421
W. Va	410	291	313	302	143
Wis	544	570	374	191	125
Other States	558	981	1,549	1,274	600
Total	31,822	31,844	34,664	36,536	38,193

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets.

[1] Gross weight includes container and wrapping.

TABLE 427.—*Frozen poultry: Cold-storage holdings,*[1] *by months, United States, 1922–1931*

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
	1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
1922	103, 697	103, 350	88, 709	68, 471	50, 840	38, 602	34, 837	30, 659	27, 671	25. 984	30, 238	51, 781
1923	100, 170	121, 632	113, 503	94, 872	74, 562	57, 274	49, 100	41, 250	34, 131	33, 142	40, 363	63, 274
1924	93, 434	99, 486	93, 497	76, 067	52, 068	39, 299	34, 886	33, 604	33, 837	40, 070	55, 139	87, 939
1925	133, 990	138, 189	130, 513	108, 608	82, 732	68, 126	58, 562	53, 558	47, 946	44, 345	53, 787	86, 733
1926	111, 501	108, 512	95, 397	73, 124	52, 783	42, 808	36, 730	35, 793	38, 634	44, 771	64, 842	106, 854
1927	144, 497	145, 076	129, 510	104, 697	77, 282	61, 525	50, 064	42, 293	39, 711	43, 201	52, 315	85, 030
1928	117, 490	118, 154	103, 494	83, 169	56, 832	43, 872	38, 230	40, 395	40, 749	43, 578	58, 093	79, 173
1929	109, 684	102, 380	89, 088	68, 728	52, 901	41, 643	42, 001	40, 896	49, 010	61, 976	86, 873	115, 876
1930	140, 723	141, 552	133, 172	105, 708	77, 420	61, 167	54, 253	46, 967	42, 589	46, 938	59. 269	82, 925
1931	104, 913	101, 307	95, 188	69, 986	45, 920	35, 348	32, 762	36, 438	43, 056	56, 215	65, 668	89, 971

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

[1] Quantities given net weight.

TABLE 428.—*Chickens: Estimated average price per pound received by producers, United States, 1910–1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1910	11. 0	11. 4	11. 8	12. 2	12. 4	12. 4	12. 2	12. 0	11. 8	11. 4	11. 0	10. 6	11. 3
1911	10. 6	10. 6	10. 7	10. 9	11. 0	11. 1	11. 2	11. 2	11. 0	10. 6	10. 0	9. 7	10. 4
1912	10. 0	10. 4	10. 6	11. 0	11. 1	11. 0	11. 2	11. 3	11. 4	11. 4	11. 0	10. 8	10. 9
1913	10. 8	11. 0	11. 4	11. 7	11. 9	12. 0	13. 0	12. 8	12. 7	13. 0	11. 4	11. 3	11. 7
1914	11. 5	12. 0	12. 4	13. 0	12. 7	13. 1	13. 4	13. 1	12. 8	12. 0	11. 1	10. 7	11. 8
1915	10. 9	11. 3	11. 7	11. 9	12. 0	12. 2	12. 2	12. 2	12. 0	11. 8	11. 5	11. 2	11. 6
1916	11. 5	12. 1	12. 5	13. 1	13. 6	14. 0	14. 1	14. 1	14. 2	14. 4	13. 9	13. 6	13. 4
1917	14. 1	15. 1	15. 7	17. 3	17. 5	17. 7	17. 4	16. 7	18. 4	18. 5	17. 0	17. 5	16. 9
1918	18. 4	20. 3	20. 2	20. 7	20. 6	21. 3	23. 2	23. 4	23. 6	22. 2	21. 7	22. 4	21. 6
1919	22. 1	21. 8	23. 4	25. 7	26. 7	26. 4	26. 8	26. 1	25. 0	23. 3	22. 0	22. 0	23. 4
1920	23. 3	25. 7	26. 9	28. 4	28. 0	27. 4	28. 4	26. 6	26. 9	24. 6	22. 9	20. 6	24. 3
1921	21. 7	22. 3	22. 8	22. 2	21. 8	21. 5	21. 7	21. 4	20. 2	19. 1	18. 6	18. 2	20. 1
1922	18. 9	19. 0	19. 4	20. 0	20. 2	20. 6	20. 7	18. 9	18. 6	18. 1	17. 2	17. 2	18. 4
1923	17. 3	18. 6	18. 8	19. 4	20. 1	20. 3	20. 6	19. 8	19. 7	19. 0	17. 7	16. 6	18. 3
1924	17. 5	18. 2	18. 9	19. 4	20. 3	20. 5	20. 2	20. 0	19. 8	19. 4	18. 5	17. 9	18. 8
1925	18. 5	19. 1	20. 0	21. 1	22. 0	21. 6	21. 4	20. 8	20. 4	20. 0	19. 2	19. 5	19. 9
1926	20. 9	21. 5	21. 9	23. 1	23. 7	23. 9	23. 6	22. 1	21. 4	20. 8	20. 0	19. 8	21. 2
1927	20. 1	21. 1	21. 3	21. 8	21. 7	20. 2	19. 9	19. 7	19. 4	19. 7	19. 4	19. 2	19. 9
1928	19. 6	20. 1	20. 1	20. 8	21. 5	21. 5	21. 9	21. 6	22. 3	22. 0	21. 5	21. 2	21. 2
1929	21. 6	22. 1	22. 7	23. 8	24. 4	24. 6	23. 7	22. 7	22. 4	21. 5	20. 3	19. 1	21. 5
1930	19. 8	20. 4	20. 6	21. 1	20. 0	19. 0	17. 4	17. 3	17. 8	17. 4	16. 1	15. 3	17. 6
1931	15. 7	15. 1	16. 1	16. 7	15. 9	16. 1	15. 8	16. 2	15. 7	14. 4	14. 4	13. 9	15. 0

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by number 1919 census to obtain a price for the United States; yearly price obtained by weighting monthly prices by receipts of dressed poultry. Average price of chickens (live weight) of all ages as reported.

TABLE 429.—*Turkeys, live: Estimated average price per pound received by producers, United States, 1912–1931*

Season	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Season	Oct. 15	Nov. 15	Dec. 15	Jan. 15
	Cents	*Cents*	*Cents*	*Cents*		*Cents*	*Cents*	*Cents*	*Cents*
1912	13. 6	14. 4	14. 8	14. 9	1922	25. 1	29. 5	32. 3	29. 7
1913	14. 6	15. 2	15. 5	15. 5	1923	26. 6	27. 9	24. 5	23. 1
1914	14. 1	14. 1	14. 5	14. 5	1924	23. 3	24. 2	25. 8	26. 2
1915	13. 7	14. 8	15. 5	15. 6	1925	24. 0	28. 3	31. 1	31. 7
1916	17. 0	18. 6	19. 6	19. 5	1926	26. 6	29. 8	32. 8	31. 6
1917	20. 0	21. 0	23. 0	22. 9	1927	26. 4	30. 8	32. 3	29. 8
1918	23. 9	25. 7	27. 0	27. 3	1928	27. 2	31. 2	30. 5	28. 2
1919	26. 6	28. 3	31. 1	32. 0	1929	27. 2	27. 1	23. 5	23. 7
1920	30. 0	31. 8	33. 1	33. 0	1930	21. 0	20. 1	19. 9	21. 6
1921	25. 7	28. 2	32. 5	30. 7	1931	17. 9	18. 3	19. 4	18. 0

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by number 1919 Census to obtain a price for the United States.

TABLE 430.—*Eggs: Receipts at six markets by State of origin, 1927–1931*

Market and origin	1927	1928	1929	1930	1931
BOSTON	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*
Illinois	319	251	195	161	191
Indiana	211	152	133	117	101
Iowa	307	194	245	272	323
Kansas	206	244	253	171	211
Maine	76	84	70	64	45
Massachusetts	16	7	6	10	9
Michigan	41	36	36	35	47
Minnesota	219	236	221	229	229
Missouri	131	106	107	64	80
Nebraska	87	94	128	139	117
New Hampshire	25	31	24	28	24
New York	41	32	31	27	25
Ohio	115	53	52	44	55
Vermont	17	22	17	17	15
Other States	149	215	200	195	164
Total	1,960	1,757	1,718	1,573	1,636
CHICAGO					
California	52	67	54	33	73
Illinois	152	120	184	150	127
Iowa	927	826	804	977	959
Kansas	477	446	315	232	295
Michigan	37	57	40	22	13
Minnesota	583	545	688	772	778
Missouri	832	674	566	542	555
Nebraska	420	438	429	399	340
North Dakota	27	38	45	40	51
Oklahoma	82	96	68	35	34
South Dakota	445	467	445	508	459
Texas	36	97	67	13	21
Wisconsin	503	427	477	490	382
Other States	328	303	216	262	227
Total	4,901	4,601	4,398	4,475	4,314
NEW YORK					
California	502	589	581	698	589
Delaware	87	72	39	39	28
Idaho	9	34	32	70	204
Illinois	950	869	771	829	704
Indiana	566	468	437	454	387
Iowa	1,038	1,071	1,254	1,388	1,354
Kansas	214	280	318	275	255
Kentucky	97	63	23	31	24
Maryland	141	131	88	70	36
Michigan	36	46	42	70	80
Minnesota	178	204	195	279	353
Missouri	342	349	403	276	328
Nebraska	64	132	145	166	273
New Jersey	194	180	214	228	232
New York	605	666	660	625	468
Ohio	356	276	204	209	226
NEW YORK—con.	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*
Oregon	64	72	48	53	94
Pennsylvania	212	191	189	214	166
Tennessee	195	186	113	87	36
Utah	114	217	215	396	554
Virginia	111	102	89	79	39
Washington	655	661	669	760	859
Wisconsin	54	54	29	49	57
Other States	264	375	371	250	255
Total	7,048	7,288	7,129	7,595	7,601
PHILADELPHIA					
California	24	82	65	112	97
Delaware	16	49	51	44	24
Illinois	110	124	113	124	187
Indiana	129	60	56	44	35
Iowa	127	128	126	125	154
Kansas	60	91	71	78	101
Maryland	35	38	43	55	33
Michigan	95	61	57	47	69
Minnesota	151	196	218	237	227
Missouri	221	183	167	157	207
Nebraska	30	29	34	39	37
New York	6	24	41	22	20
Ohio	96	54	51	47	27
Pennsylvania	97	273	274	287	177
Tennessee	59	22	15	25	9
Virginia	129	125	108	86	37
Washington	28	59	61	72	76
West Virginia	13	6	5	4	3
Wisconsin	46	38	52	65	67
Other States	77	93	89	89	143
Total	1,549	1,735	1,697	1,759	1,730
SAN FRANCISCO					
California	705	710	737	749	730
Idaho	6	13	3	2	2
Oregon	19	23	18	8	20
Washington	17	6	4	(1)	3
Other States	3	4	4	6	3
Total	750	756	766	765	758
LOS ANGELES					
California	409	604	641	761	730
Idaho	22	10	31	22	6
Oregon	6	7	18	5	14
Utah	19	4	20	52	3
Other States	4	8	25	4	14
Total	460	633	735	844	767

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets. Reported in cases of 30 dozen.

[1] Not over 500 cases.

TABLE 431.—*Eggs: Receipts at five markets, by months, specified years*

Market and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	1,000 cases	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*
Boston:													
1928	102	145	229	211	258	200	158	112	96	96	78	72	1,757
1929	133	99	190	290	234	177	176	125	110	77	54	53	1,718
1920	96	112	209	227	208	175	138	102	82	66	68	90	1,573
1931	126	153	198	207	219	188	125	108	95	77	62	78	1,636
New York:													
1928	412	613	931	1,052	1,089	767	591	494	407	392	268	272	7,288
1929	394	371	821	1,061	999	837	668	526	444	380	293	335	7,129
1930	461	511	938	1,155	1,076	785	645	451	496	373	322	382	7,595
1931	478	530	940	1,116	1,052	868	568	516	484	398	304	347	7,601
Philadelphia:													
1928	97	133	176	210	246	175	168	117	140	103	75	95	1,735
1929	118	76	169	234	220	181	156	143	131	94	74	101	1,697
1930	100	112	204	244	261	178	145	94	114	91	86	130	1,759
1931	133	148	189	205	184	186	141	132	124	92	97	99	1,730
Chicago:													
1928	200	366	592	813	849	562	356	284	241	150	75	113	4,601
1929	206	222	554	924	799	554	342	301	210	135	62	89	4,398
1930	202	308	641	927	747	516	381	231	211	131	69	111	4,475
1931	231	367	634	867	709	559	290	238	191	96	61	71	4,314
San Francisco:													
1928	52	63	106	75	61	59	61	69	54	52	49	55	756
1929	67	63	82	86	80	65	67	55	49	49	49	54	766
1930	59	67	71	79	73	74	69	65	50	55	47	56	765
1931	58	66	85	83	72	61	56	59	49	59	54	56	758
Total:													
1919	494	1,014	1,556	2,761	2,424	1,890	1,276	1,018	826	691	394	341	14,686
1920	508	815	1,447	1,934	2,203	1,805	1,143	911	806	594	398	382	12,946
1921	653	1,161	2,209	2,467	2,055	1,561	1,142	1,107	909	727	488	531	15,010
1922	809	1,025	1,952	2,902	2,583	1,926	1,304	1,019	816	704	484	492	16,016
1923	852	1,032	2,118	2,268	2,852	2,066	1,349	1,180	988	844	555	587	16,691
1924	714	1,006	1,654	2,539	2,544	1,871	1,431	1,042	876	748	457	524	15,406
1925	618	1,176	1,846	2,563	2,193	2,025	1,315	1,106	930	709	433	626	15,540
1926	906	1,070	1,741	2,086	2,261	2,015	1,386	1,081	933	699	581	752	15,511
1927	971	1,178	1,997	2,730	2,523	1,767	1,226	1,004	897	704	603	608	16,208
1928	863	1,320	2,034	2,361	2,503	1,763	1,334	1,076	938	793	545	607	16,137
1929	918	831	1,816	2,595	2,332	1,814	1,409	1,150	944	735	532	632	15,708
1930	918	1,110	2,063	2,632	2,365	1,728	1,378	943	953	716	592	769	16,167
1931	1,026	1,264	2,046	2,478	2,236	1,862	1,180	1,053	943	722	578	651	16,039

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets. Reported in cases of 30 dozen. See 1927 Yearbook, p. 1098, for data for earlier years.

TABLE 432.—*Eggs, case and frozen: Cold-storage holdings, United States, 1922–1931*

Kind and year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
	1,000 cases	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*	*1,000 cases*
Case eggs: [1]												
1922	889	179	13	950	4,648	8,056	9,811	10,161	9,608	7,924	5,726	3,257
1923	1,311	213	13	453	3,737	7,890	10,222	10,509	9,883	8,737	6,645	4,028
1924	1,927	500	44	579	3,563	6,875	8,685	9,267	8,778	7,409	5,267	3,102
1925	1,050	81	21	1,240	4,872	7,712	9,482	10,024	9,873	8,612	6,322	3,786
1926	1,683	578	77	872	3,735	7,236	9,133	9,845	9,573	8,048	5,888	3,215
1927	1,096	253	92	1,868	5,501	8,962	10,565	10,746	9,650	7,960	5,485	2,956
1928	882	26	66	1,087	4,515	8,168	10,002	10,496	9,944	8,542	6,247	3,542
1929	1,415	248	11	559	3,952	6,705	8,510	8,962	8,547	7,195	4,930	2,631
1930	704	139	84	2,231	5,766	9,178	10,743	11,198	10,375	9,174	6,785	4,154
1931	1,894	735	408	1,893	5,162	7,887	9,507	9,504	9,016	7,960	5,745	3,447
	1,000 lbs.	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
Frozen eggs: [2]												
1922	19,260	16,209	13,193	10,473	14,154	18,273	23,528	27,855	34,516	33.545	30,523	26,233
1923	22,787	18,517	14,603	10,311	12,921	20,730	29,686	36,192	37,280	43,836	40,424	36,004
1924	32,087	27,682	23,106	20,736	23,707	29,956	33,565	35,184	34,128	31,006	26,633	22,100
1925	21,303	16,292	11,364	11,353	19,579	29,544	38,379	42,855	47,099	44,299	45,314	39,336
1926	33,905	29,256	24,167	21,849	25,739	34,815	45,688	51,810	52,634	51,062	44,966	38,620
1927	33,593	31,207	26,053	33,272	52,053	71,605	81,263	81,418	77,508	71,208	62,066	54,703
1928	47,020	38,575	31,362	34,411	51,532	67,941	77,744	81,670	89,196	82,255	73,327	64,201
1929	56,181	48,055	38,250	34,918	51,825	71,560	84,766	91,488	86,693	81,541	70,331	61,772
1930	53,644	44,080	35,192	49,751	76,664	106,904	115,134	116,272	113,138	106,631	98,359	89,571
1931	83,184	75,685	73,889	78,051	91,517	106,607	113,513	114,700	110,271	103,302	94,816	86,407

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

[1] 30-dozen cases. [2] Quantities given are net weight.

TABLE 433.—*Eggs and egg products: International trade, average 1925–1929, annual 1927–1930*

EGGS IN THE SHELL

Country	Calendar year									
	Average 1925–1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 dozen*	*1,000 dozen*	*1,000 dozen*	*1,000 dozen*	*1,000 dozen*	*1,000 dozen*	*1,000 dozen*	*1,000 dozen*	*1,000 dozen*	*1,000 dozen*
Netherlands	98,429	8,965	103,614	10,502	111,145	11,376	119,909	4,879	124,860	1,324
Russia	86,978	0	102,186	0	141,429	0	65,219	0	14,471	0
Poland	76,215	493	96,400	184	80,190	601	78,620	298	80,999	50
Denmark	67,641	225	70,405	284	65,750	153	65,474	25	71,852	52
China	56,278	0	50,235	0	52,059	0	50,489	0	51,360	0
Irish Free State	47,058	449	49,462	372	50,465	547	48,109	275	47,355	106
Belgium	41,430	1,419	39,956	995	56,819	917	59,405	1,487	42,934	1,726
Italy	25,943	17,969	20,700	22,379	17,675	26,299	15,192	24,071	13,701	33,583
France	24,536	11,499	15,863	9,435	46,564	11,723	38,065	21,619	30,144	21,176
United States	22,521	350	28,707	250	20,192	286	12,075	308	18,579	317
Hungary	18,026	338	20,933	299	12,999	410	10,589	431	19,367	204
Bulgaria	17,258	0	18,335	0	15,650	0	18,697	0	28,239	------
Rumania	15,011	1	11,696	1	[2] 13,328	[2] 0	[2] 16,989	[2] 1	[2] 24,725	[2] 1
Morocco	14,985	0	11,983	0	13,207	0	18,469	0	14,629	0
Egypt	10,879	6	9,197	0	10,625	14	12,461	1	8,202	0
Algeria	5,830	17	4,702	[2] 4	5,762	[2] 30	6,838	[2] 48	4,233	[2] 15
Lithuania	5,313	0	5,349	0	5,388	0	4,626	0	4,599	0
Sweden	4,422	679	5,486	215	5,432	334	7,419	351	6,543	628
Union of South Africa	3,477	113	3,601	126	3,929	146	4,546	48	6,158	47
Estonia	1,428	4	1,340	0	1,960	20	1,859	0	2,065	1
Norway	570	111	98	84	178	102	995	119	1,056	114
Finland	58	37	26	17	9	74	59	14	637	[2] 12
Total	644,286	42,675	670,274	45,147	730,755	53,032	656,104	53,975	616,708	59,356
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom	973	238,350	965	243,012	1,131	263,740	1,556	247,429	715	264,306
Germany	591	220,035	286	225,119	685	245,746	253	229,412	159	219,909
Spain	15	34,479	12	35,102	12	48,585	13	44,341	13	39,154
Austria	1,730	22,033	2,002	24,786	1,727	25,692	1,773	20,884	1,942	25,869
Japan	0	20,465	0	21,700	0	16,269	0	10,074	0	8,167
Switzerland	13	17,132	12	16,159	17	16,964	16	18,004	9	20,221
Argentina	1,518	9,791	977	10,976	1,073	11,792	482	11,388	1,424	14,846
Cuba	0	8,793	0	11,220	0	6,392	0	2,642	0	1,314
Philippine Islands	0	5,935	0	5,728	0	6,016	0	7,237	0	6,958
Czechoslovakia	1,828	4,917	3,287	4,287	1,999	7,205	1,921	7,114	2,628	7,937
Mexico	0	4,202	0	5,009	0	3,903	0	2,295	0	4,361
British Malaya	366	3,638	292	4,357	340	3,618	426	4,606	270	4,341
Canada	1,365	2,244	448	3,227	988	997	1,148	713	189	2,908
Chile	[3] 22	67	------	[2] 34	0	139	1	154	[2] 19	[2] 337
Total	8,421	592,081	8,281	610,716	7,972	657,058	7,589	606,293	7,368	620,628

EGGS NOT IN THE SHELL

Country	Average 1925–1929 Exports	Average 1925–1929 Imports	1927 Exports	1927 Imports	1928 Exports	1928 Imports	1929 Exports	1929 Imports	1930 [1] Exports	1930 [1] Imports
PRINCIPAL EXPORTING COUNTRY	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*
China	128,990	0	100,856	0	126,803	0	150,923	0	153,304	0
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom	598	65,731	466	70,058	615	65,221	384	74,542	157	85,630
United States	464	24,914	661	15,341	508	23,474	326	26,030	196	16,156
Germany	2,098	18,252	1,544	17,836	2,385	19,362	2,413	25,544	2,065	27,232
France	238	7,375	175	4,978	99	9,026	516	11,919	303	15,504
Netherlands	860	4,355	862	3,970	1,064	4,133	791	5,485	1,009	5,588
Canada	0	1,700	0	2,025	0	3,030	0	560	0	1,758
Italy	16	1,317	27	953	28	1,376	6	1,647	12	1,854
Belgium	216	1,137	85	1,110	194	1,169	589	1,628	486	1,643
Irish Free State	19	1,031	37	1,090	13	883	4	1,067	[2] 0	1,126
Sweden	5	859	0	673	1	828	2	1,232	19	1,074
Czechoslovakia	13	850	22	812	9	901	7	1,233	7	1,596
Austria	8	680	0	350	27	715	5	1,632	1	1,290
Denmark	7	512	6	461	11	293	1	458	[2] 7	778
Union of South Africa	16	54	5	40	0	24	0	14	31	7
Norway	0	11	0	6	0	10	0	19	0	[2] 22
Total	4,558	128,778	3,890	119,703	4,954	130,445	5,044	153,010	4,293	161,258

Bureau of Agriculture Economics. Official sources except where otherwise noted. In countries reporting in units of weight, the conversion factor used is 1½ pounds equals 1 dozen.

[1] Preliminary. [2] International Yearbook of Agricultural Statistics. [3] 4-year average.

TABLE 434.—*Eggs: Average price per dozen at five markets, by months, specified years*

Market, grade, and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
New York:													
Fresh firsts—	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1910	38	27	23	22	21	20	18	21	24	26	31	34	25
1911	28	19	17	17	17	15	17	18	21	24	32	35	22
1912	34	36	22	20	19	19	20	21	24	26	31	29	25
1913	24	22	19	19	20	19	19	23	27	29	39	36	25
1914	33	29	26	20	20	21	21	24	26	27	35	38	27
1915	38	26	20	21	20	20	20	22	26	30	35	34	26
1916	31	26	22	22	22	23	25	29	33	34	41	46	30
1917	46	45	31	34	35	33	34	38	41	41	49	57	40
1918	65	58	38	35	35	36	41	43	47	53	65	67	49
1919	62	44	44	43	46	44	46	48	51	62	69	79	53
1920	71	59	48	44	44	43	47	51	57	64	77	78	57
1921	67	42	31	27	25	27	33	35	39	49	58	54	41
1922	41	38	25	26	27	25	24	26	39	43	53	53	35
1923	42	37	31	27	27	24	25	29	35	39	53	47	35
1924	42	39	25	24	25	27	29	33	39	44	52	57	36
1925	59	44	30	29	32	33	33	33	37	43	56	51	40
1926	38	31	29	32	31	30	29	31	38	40	50	48	36
1927	42	32	25	26	23	23	25	28	34	40	44	45	32
1928	45	32	29	28	30	29	30	31	33	32	37	37	33
1929	36	41	33	28	31	31	32	34	36	40	48	51	37
1930	42	35	26	27	23	24	22	25	25	26	31	29	28
1931	21	20	22	20	19	19	20	22	24	24	28	27	22
Chicago:													
Fresh firsts—													
1927	38	27	24	23	22	22	23	26	33	37	42	43	30
1928	43	29	27	27	28	28	28	30	32	34	41	39	32
1929	36	38	29	26	30	29	31	33	37	42	47	48	35
1930	40	34	24	24	21	22	21	25	26	28	33	28	27
1931	21	16	19	17	17	16	18	19	20	24	29	24	20
Boston:													
Western firsts—													
1927	41	31	26	25	24	23	25	28	34	39	44	44	32
1928	46	35	29	29	30	30	30	32	34	36	44	43	35
1929	38	43	32	28	31	31	32	35	37	40	49	52	37
1930	44	37	26	26	24	24	22	25	25	26	34	28	39
1931	25	18	21	20	18	17	19	20	21	25	30	27	22
Philadelphia:													
Extra firsts—													
1927	43	33	27	26	26	25	28	33	40	48	55	50	36
1928	50	37	30	30	32	32	33	36	39	42	50	45	38
1929	41	45	35	29	33	34	36	39	44	49	56	58	41
1930	46	40	28	28	26	27	28	32	33	36	44	32	33
1931	28	20	22	21	19	21	24	24	26	29	34	31	25
San Francisco:													
Fresh extras—													
1927	33	25	23	24	24	24	26	32	39	47	44	38	32
1928	33	24	25	25	26	29	30	33	39	44	45	38	33
1929	31	26	25	26	31	32	37	41	44	52	49	44	36
1930	36	28	28	28	27	26	26	31	37	40	41	27	31
1931	22	19	20	20	20	20	22	26	31	38	33	29	25

Bureau of Agricultural Economics. Prices 1910–1922 are averages of daily prices in New York Journal of Commerce. Subsequently monthly prices from the Bureau of Labor Statistics, except San Francisco, which is from the Pacific Dairy Review. Earlier data are available in 1925 Yearbook, p. 1224, Table 636, and 1927 Yearbook, p. 1105.

TABLE 435.—*Eggs: Estimated average price per dozen received by producers, United States, 1910–1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weighted average
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1910	29.7	25.9	20.8	18.6	18.4	18.2	17.9	18.5	20.9	23.8	27.2	29.7	20.5
1911	26.2	19.3	15.7	14.8	14.6	14.4	14.8	16.4	18.7	21.8	26.1	29.1	16.9
1912	29.3	26.8	21.2	17.4	16.9	16.7	17.0	18.2	20.6	24.0	27.8	28.2	19.8
1913	24.8	21.1	17.9	15.9	16.1	16.8	16.4	17.7	21.3	26.0	31.3	32.9	18.8
1914	29.8	25.3	22.2	16.4	16.9	17.2	17.5	19.1	22.5	23.7	28.2	31.9	20.1
1915	31.7	23.7	16.5	16.6	16.5	16.1	16.3	17.3	20.6	24.6	29.4	31.1	18.9
1916	28.8	24.2	18.2	17.7	18.5	18.9	19.9	21.6	25.3	30.4	34.9	38.3	21.4
1917	38.1	35.7	25.3	28.5	30.2	29.9	29.0	30.5	35.8	38.5	41.2	45.9	31.3
1918	48.9	45.8	30.9	30.4	30.6	29.5	33.0	35.2	39.1	44.9	51.7	59.3	35.2
1919	55.3	34.8	33.9	36.0	38.9	36.1	37.9	40.6	43.1	51.0	59.1	69.6	39.9
1920	60.9	48.5	40.5	36.6	37.5	35.9	37.8	42.5	48.6	54.6	62.9	67.1	42.3
1921	54.5	31.0	26.8	20.5	19.4	20.1	24.3	28.9	30.9	39.4	50.0	51.1	26.9
1922	31.7	31.4	19.5	20.0	20.9	20.2	20.3	20.6	27.3	34.6	43.6	47.2	23.9
1923	37.8	29.9	25.4	21.6	21.8	20.9	21.3	23.6	29.8	34.6	45.6	45.5	25.6
1924	35.4	33.6	20.4	19.1	19.8	21.1	22.8	26.1	31.8	38.2	45.8	49.9	25.2
1925	48.6	35.7	23.9	24.2	24.8	26.1	27.9	30.0	31.1	37.7	46.8	48.1	29.1
1926	36.3	28.9	24.1	24.8	25.2	25.7	25.7	26.4	31.5	36.8	44.9	47.6	27.9
1927	36.9	29.0	20.8	20.3	19.8	17.8	20.7	23.4	29.4	35.6	41.6	43.3	23.8
1928	38.2	29.1	23.4	22.8	24.2	23.9	25.6	27.4	31.4	34.9	39.6	42.9	26.8
1929	33.0	31.9	28.0	23.0	24.4	26.1	27.2	29.8	33.9	38.4	44.2	45.8	28.6
1930	38.4	31.8	21.3	21.5	20.0	18.6	18.8	20.6	25.3	26.5	31.7	26.8	22.7
1931	22.1	14.1	17.0	16.2	13.3	14.1	14.8	17.3	19.1	22.7	26.4	25.6	16.6

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices by States, weighted by production 1919 census to obtain a price for the United States. Yearly price obtained by weighting monthly prices by receipts monthly.

STATISTICS OF FOREIGN TRADE IN AGRICULTURAL PRODUCTS

TABLE No. 436.—*Summary of exports and imports, United States, 1908–9 to 1930–31*

Year beginning July—	Total exports	Agricultural exports [1]: Domestic: Value	Agricultural exports [1]: Domestic: Percentage of total	Agricultural exports [1]: Reexports	Total imports	Agricultural imports [1]: Value	Agricultural imports [1]: Percentage of total	Excess of agricultural exports	Forest products: Exports: Domestic	Forest products: Exports: Reexports	Forest products: Imports	Forest products: Excess of imports
	1,000 dollars	*1,000 dollars*	*Per cent*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*Per cent*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
1908–9	1,638,356	903,238	55.1	12,779	1,311,920	703,323	53.6	212,694	72,442	1,789	60,753	[3] 13,478
1909–10	1,710,084	871,158	50.9	22,162	1,556,947	794,370	51.0	98,950	85,030	2,110	75,010	[3] 12,130
1910–11	2,013,549	1,030,794	51.2	20,573	1,527,226	773,116	50.6	278,251	103,039	1,679	71,736	[3] 32,982
1911–12	2,170,320	1,050,627	48.4	17,171	1,653,265	888,495	53.7	179,303	108,122	1,350	69,581	[3] 39,891
1912–13	2,428,506	1,123,652	46.3	19,652	1,813,008	916,634	50.6	226,670	124,836	2,809	82,878	[3] 44,767
1913–14	2,329,684	1,113,974	47.8	20,286	1,893,926	1,000,409	52.8	133,851	106,979	1,961	81,162	[3] 27,778
1914–15	2,716,178	1,475,938	54.3	38,222	1,674,170	997,911	59.6	516,249	52,554	1,287	79,451	25,610
1915–16	4,272,178	1,518,071	35.5	45,017	2,197,884	1,349,563	61.4	213,525	68,155	1,435	94,265	24,675
1916–17	6,227,164	1,968,253	31.6	45,420	2,659,355	1,599,660	60.2	414,013	68,919	3,392	129,580	57,269
1917–18	5,838,652	2,280,466	39.1	44,210	2,945,655	1,826,436	62.0	498,240	87,181	1,409	128,490	39,900
1918–19	7,081,462	3,579,918	50.6	105,587	3,095,720	1,930,028	62.3	1,755,477	113,275	3,758	132,588	15,555
1919–20	7,949,309	3,861,511	48.6	128,191	5,238,352	3,410,018	65.1	579,684	190,049	5,380	229,091	33,662
1920–21	6,385,884	2,607,641	40.8	90,739	3,654,459	2,060,237	56.4	638,143	141,876	4,043	225,162	79,243
1921–22	3,699,909	1,915,866	51.8	43,589	2,608,079	1,371,720	52.6	587,735	94,115	2,315	156,843	70,413
1922–23	3,886,682	1,799,168	46.3	48,393	3,780,959	2,077,240	54.9	[2] 229,679	129,981	1,955	234,598	102,662
1923–24	4,223,973	1,867,098	44.2	62,719	3,554,037	1,875,365	52.8	54,452	162,374	1,563	216,712	52,775
1924–25	4,778,155	2,280,381	47.7	64,168	3,824,128	2,057,163	53.8	287,386	156,187	1,290	227,423	69,946
1925–26	4,653,148	1,891,739	40.7	75,162	4,464,872	2,529,775	56.7	[2] 562,874	162,731	1,450	238,545	74,364
1926–27	4,867,346	1,907,864	39.2	72,222	4,252,024	2,281,421	53.7	[2] 301,335	171,970	1,365	238,247	64,912
1927–28	4,773,332	1,815,451	38.0	73,391	4,147,499	2,193,868	52.9	[2] 305,026	174,599	1,528	215,874	39,747
1928–29	5,283,938	1,847,216	35.0	63,942	4,291,888	2,179,046	50.8	[2] 267,888	178,092	2,157	222,249	42,000
1929–30	4,617,730	1,495,907	32.4	50,670	3,848,971	1,890,508	49.1	[2] 343,931	161,743	1,382	209,418	46,293
1930–31	3,031,817	1,038,040	34.2	28,803	2,432,152	1,163,059	47.8	[2] 96,216	97,704	878	142,589	44,007

Bureau of Agricultural Economics. This table supersedes Table No. 500 in the Yearbook of Agriculture, 1931, the value of total imports and exports has been given and the imports of "rubber, unmanufactured, and similar gums" have been deducted from the "imports of forest products" and added to "imports of agricultural products," also reexports of "rubber, unmanufactured, and similar gums" have been deducted from "reexports of forest products" and added to "reexports of agricultural products." "Rubber, unmanufactured, and similar gums," includes: Balata, guayule, gutta-joolatong or jelutong or pontianak, gutta-percha, India rubber crude, and India rubber scrap or refuse, fit only for remanufacture.

[1] Does not include forest products, but includes rubber now mostly a plantation product.
[2] Excess of agricultural imports.
[3] Excess of exports.

TABLE 437.—*Agricultural products: Value of trade between continental United States and noncontiguous Territories, 1921–22 to 1930–31*

Year beginning July—	Porto Rico: United States shipments to	Porto Rico: Shipments to United States	Hawaii: United States shipments to	Hawaii: Shipments to United States	Alaska: United States shipments to	Alaska: Shipments to United States
	1,000 dollars	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
1921–22	21,926	53,892	12,734	66,292	7,123	13
1922–23	24,080	61,801	15,096	93,313	8,297	190
1923–24	28,819	66,581	17,539	104,267	9,016	365
1924–25	29,710	70,190	17,954	97,430	9,774	415
1925–26	32,212	70,385	17,806	105,470	9,539	516
1926–27	32,603	84,061	18,019	98,600	8,737	720
1927–28	28,146	82,326	19,004	110,338	9,435	231
1928–29	31,466	53,333	19,348	103,653	9,108	290
1929–30	28,117	75,868	19,883	98,097	9,257	511
1930–31 [1]	25,061	75,320	17,759	102,932	6,980	380

Bureau of Agricultural Economics. Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1923–1931.

[1] Preliminary.

TABLE 438.—*Agricultural products: Value of principal groups exported from and imported into the United States, 1928–29 to 1930–31*

Article	Year beginning July—					
	Domestic exports			General imports		
	1928–29	1929–30	1930–31 [1]	1928–29	1929–30	1930–31 [1]
ANIMALS AND ANIMAL PRODUCTS	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
Animals, live	6,058	5,307	2,955	29,634	21,148	5,312
Dairy products	17,668	16,575	12,248	37,764	31,907	16,942
Eggs and egg products	5,145	4,470	3,472	8,130	8,851	2,890
Hides and skins, raw (except fur)	9,112	5,896	4,208	131,780	129,890	60,734
Meat and meat products	187,873	181,585	117,194	30,654	23,754	6,893
Silk, unmanufactured				393,648	360,682	227,323
Wool and mohair, unmanufactured	107	103	55	86,521	59,414	24,388
Animal products, miscellaneous	13,658	11,184	7,467	40,862	40,686	27,617
Total animals and animal products	239,621	225,120	147,599	758,993	676,332	372,129
VEGETABLE PRODUCTS						
Chocolate and cocoa	606	616	449	45,771	40,755	28,029
Coffee	2,627	2,746	2,790	308,268	256,541	192,820
Cotton lint, unmanufactured	861,099	667,243	422,104	56,437	42,078	5,328
Linters	7,120	3,959	2,453			
Total cotton, unmanufactured	868,219	671,202	424,557	56,437	42,078	5,328
Fruits	149,349	110,431	120,585	56,392	60,889	47,309
Grains and grain products	335,425	248,268	146,580	37,026	24,280	26,265
Nuts	1,528	1,398	1,169	31,208	24,765	17,738
Oilseeds and oilseed products	40,707	32,875	15,605	188,383	167,286	101,086
Rubber and similar gums				235,075	195,680	96,113
Seeds, except oilseeds	2,854	3,755	3,198	9,343	7,819	5,315
Spices	296	344	178	18,811	18,435	11,162
Sugar, molasses, and sirups	9,951	6,489	4,066	227,825	176,565	126,527
Tea				26,968	24,321	21,904
Tobacco, unmanufactured	148,077	148,452	142,283	55,803	47,556	37,691
Vegetables and preparations	23,333	23,638	15,403	39,880	49,823	28,298
Vegetable products, miscellaneous	24,623	20,573	13,578	82,385	77,383	45,345
Total vegetable products	1,607,595	1,270,787	890,441	1,419,575	1,214,176	790,930
Total animal and vegetable products	1,847,216	1,495,907	1,038,040	2,178,568	1,890,508	1,163,059
FOREST PRODUCTS						
Dyeing and tanning materials	2,414	2,258	1,621	8,019	8,065	5,524
Gums, resins, and balsams	28,701	28,511	17,635	35,969	29,134	15,505
Wood	138,635	122,648	72,777	86,210	79,049	51,728
Forest products, miscellaneous	8,342	8,326	5,671	92,051	93,170	69,832
Total forest products	178,092	161,743	97,704	222,249	209,418	142,589
Total agricultural products	2,025,308	1,657,650	1,135,744	2,400,817	2,099,926	1,305,648

Bureau of Agricultural Economics. Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1929 and 1931. In the statistics of foreign commerce of the United States, the Philippine Islands are treated as a foreign country. The statistics of foreign commerce include the trade of the customs districts of Alaska, Hawaii, and Porto Rico with foreign countries, but do not include the trade of these Territories with the United States.

[1] Preliminary.

TABLE 439.—*Index numbers of United States agricultural exports, 1909–10 to 1930–31*

[Base 1910–1914=100]

Year beginning July—	All commodities	All commodities except cotton	Cotton fiber	Grains and products	Cattle and meat products	Dairy products	Fruits	Tobacco
1909–10	78	86	73	82	91	58	76	91
1910–11	92	92	91	85	104	93	89	90
1911–12	114	100	125	78	115	126	101	97
1912–13	110	119	103	143	97	120	136	107
1913–14	106	103	108	112	92	103	98	114
1914–15	138	189	99	301	126	302	119	89
1915–16	118	184	70	237	164	479	109	113
1916–17	118	182	70	217	164	716	101	105
1917–18	101	165	53	179	197	975	63	74
1918–19	145	255	63	272	287	1,287	111	160
1919–20	134	207	80	218	185	1,275	122	165
1920–21	127	212	64	329	154	524	108	129
1921–22	137	218	76	317	153	571	105	118
1922–23	112	182	59	246	169	406	121	116
1923–24	104	153	67	143	179	451	214	152
1924–25	126	167	95	225	140	396	184	110
1925–26	106	123	93	117	114	327	211	137
1926–27	136	143	131	188	98	288	301	132
1927–28	112	138	92	188	98	263	258	125
1928–29	117	141	99	174	102	243	372	144
1929–30	97	117	82	130	104	221	216	153
1930–31	90	101	81	104	74	190	337	150

Bureau of Agricultural Economics. Computations are based on the gross exports of 44 of the most important farm products. The index numbers were calculated as follows: Quantities of various commodities exported each year were multiplied by the average yearly export prices of these commodities from July, 1909, to June, 1914. The sum of the values determined in this way was then divided by the average yearly value of exports from 1909–10 to 1913–14 to obtain the index.

TABLE 440.—*Exports and imports of selected forest products, 1909–10 to 1930–31*

Year beginning July—	Domestic exports					Imports				
	Lumber		Rosin	Spirits of turpentine	Timber, hewn and sawed	Camphor, crude	Lumber		Shellac	Wood pulp
	Boards, deals, and planks	Staves					Boards, deals, planks and other sawed	Shingles		
	1,000 M feet	*Thousands*	*1,000 barrels*	*1,000 gallons*	*1,000 M feet*	*1,000 pounds*	*1,000 M feet*	*1,000 M*	*1,000 pounds*	*1,000 long tons*
1909–10	1,684	49,784	2,144	15,588	491	3,007	1,054	763	29,402	378
1910–11	2,032	65,726	2,190	14,818	532	3,726	872	643	15,495	492
1911–12	2,307	64,163	2,474	19,599	438	2,155	905	515	18,746	478
1912–13	2,550	89,006	2,806	21,094	512	3,709	1,091	560	21,912	502
1913–14	2,405	77,151	2,418	18,901	441	3,477	929	895	16,720	508
1914–15	1,129	39,297	1,372	9,464	174	3,729	939	1,487	24,153	588
1915–16	1,177	57,538	1,571	9,310	201	4,574	1,218	1,769	25,818	507
1916–17	1,042	61,469	1,639	8,842	184	6,885	1,175	1,924	32,540	699
1917–18	1,068	63,207	1,071	5,095	106	3,638	1,283	1,878	22,913	504
1918–19	1,073	62,753	882	8,065	92	2,623	977	1,757	14,269	475
1919–20	1,518	80,791	1,322	7,461	234	4,026	1,492	2,152	34,151	727
1920–21	1,269	65,710	877	9,742	123	2,093	920	1,831	23,872	624
1921–22	1,543	35,162	786	10,786	268	1,592	1,124	2,190	30,768	902
1922–23	1,549	57,466	1,040	9,012	383	3,498	1,958	2,695	32,773	1,293
1923–24	1,867	60,868	1,205	11,194	815	1,955	1,786	2,417	28,512	1,188
1924–25	1,929	79,922	1,412	12,308	586	1,904	1,732	2,551	21,436	1,529
1925–26	1,985	75,534	1,073	10,254	652	2,616	1,860	2,482	26,188	1,469
1926–27	2,013	74,826	1,229	13,820	707	2,175	1,841	2,275	28,707	1,509
1927–28	2,318	78,466	1,300	14,332	825	2,704	1,529	2,034	23,012	1,521
1928–29	2,387	82,409	1,309	14,175	711	5,064	1,441	2,052	31,548	1,643
1929–30	2,100	78,624	1,366	15,722	657	1,777	1,461	1,387	26,444	1,722
1930–31 [1]	1,468	47,207	1,104	13,292	406	1,246	916	1,058	14,145	1,456

Bureau of Agricultural Economics. Compiled from Foreign Commerce and Navigation of the United States, 1909–1918, and Monthly Summary of Foreign Commerce of the United States, June issues, 1920–1931.

[1] Preliminary.

TABLE 441.—*Exports of selected domestic agricultural products, averages 1899–1900 to 1908–9, annual 1909–10 to 1930–31*

Year beginning July—	Butter	Cheese	Milk, condensed and evaporated	Eggs in the shell	Pork and its products, total[1]	Pork, fresh	Pork, pickled	Bacon, including Cumberland sides	Hams and shoulders, including Wiltshire sides	Lard
Average:	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 dozen*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
1899–1900 to 1903–4	15,425	31,552	[2]	3,125	1,305,217	28,090	119,050	361,686	209,954	576,414
1904–5 to 1908–9	12,484	11,849	[2]	5,439	1,248,682	13,157	125,799	271,929	208,230	622,299
1909–10	3,141	2,847	13,311	5,326	707,110	1,040	40,032	152,163	146,885	362,928
1910–11	4,878	10,367	12,180	8,559	879,455	1,355	45,729	156,675	57,709	476,108
1911–12	6,092	6,338	20,643	15,406	1,071,952	2,598	56,321	208,574	204,044	532,256
1912–13	3,586	2,599	16,526	20,409	984,697	2,458	53,749	205,994	159,545	519,025
1913–14	3,694	2,428	16,209	16,149	921,913	2,668	45,543	193,964	165,882	481,458
1914–15	9,851	55,363	37,236	20,784	1,106,180	3,908	45,656	346,718	203,701	475,532
1915–16	13,487	44,394	159,578	26,396	1,462,697	63,006	63,461	579,809	282,209	427,011
1916–17	26,835	66,050	259,141	24,926	1,501,948	50,436	46,993	667,152	266,657	444,770
1917–18	17,736	44,303	528,759	18,969	1,692,124	21,390	33,222	815,294	419,572	392,506
1918–19	33,740	18,792	728,741	28,385	2,704,694	19,644	31,504	1,238,247	667,240	724,771
1919–20	27,156	19,378	708,463	38,327	1,762,611	27,225	41,643	803,667	275,456	587,225
1920–21	7,829	10,826	262,668	26,960	1,522,162	57,075	33,286	489,298	172,012	746,157
1921–22	7,512	7,471	277,311	33,762	1,516,320	25,911	33,510	350,549	271,642	812,379
1922–23	9,410	8,446	157,038	34,284	1,794,880	43,772	40,934	408,334	319,269	952,642
1923–24	5,425	3,938	213,613	32,832	1,934,189	49,113	37,469	423,500	381,564	1,014,898
1924–25	8,384	9,432	173,547	25,107	1,400,149	27,603	26,726	236,263	292,214	792,735
1925–26	5,280	4,094	135,865	27,931	1,172,685	15,867	29,126	186,153	220,014	695,445
1926–27	5,048	3,773	108,942	27,962	1,012,668	10,881	27,962	127,576	143,649	675,812
1927–28	3,965	2,873	108,943	22,832	1,046,306	11,059	31,650	126,977	127,819	716,398
1928–29	3,778	2,572	112,492	15,982	1,112,394	10,641	39,906	129,248	125,396	780,914
1929–30	3,582	2,339	101,572	14,234	1,138,588	18,768	39,809	132,967	130,318	787,160
1930–31[3]	2,293	1,733	78,986	14,386	791,353	11,093	21,118	52,412	99,749	585,670

Year beginning July—	Beef and its products, total[4]	Oleo oil	Cotton lint[5]	Linters[5]	Cottonseed cake and meal	Linseed cake and meal	Prunes	Raisins	Apples, fresh	Oranges	Sugar, raw and refined[6]
Average:	*1,000 pounds*	*1,000 pounds*	*1,000 bales*	*1,000 bales*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 barrels*	*1,000 boxes*	*1,000 sh. tons*
1899–1900 to 1903–4	636,969	147,626	6,669	------	1,074,720	552,190	39,767	3,314	1,109	[2]	6
1904–5 to 1908–9	599,332	188,550	8,303	------	1,173,349	684,450	35,003	6,856	1,239	[2]	16
1909–10	286,296	126,092	6,413	------	640,089	652,317	89,015	8,526	922	932	63
1910–11	265,924	138,697	8,068	------	804,597	559,675	51,031	18,660	1,721	1,179	28
1911–12	233,925	126,467	11,070	------	1,293,690	596,115	74,328	19,949	1,456	1,197	40
1912–13	170,208	92,850	9,125	------	1,128,092	838,120	117,951	28,121	2,150	1,063	22
1913–14	151,212	97,017	9,522	------	799,974	662,869	69,814	14,766	1,507	1,559	26
1914–15	394,981	80,482	8,581	226	1,479,065	524,794	43,479	24,845	2,352	1,759	275
1915–16	457,556	102,646	5,917	251	1,057,222	640,916	57,423	75,015	1,466	1,575	815
1916–17	423,674	67,110	5,702	474	1,150,160	536,984	59,645	51,993	1,740	1,850	625
1917–18	600,132	56,603	4,455	186	44,681	151,400	32,927	54,988	635	1,240	288
1918–19	591,302	59,292	5,442	84	311,624	202,788	59,072	84,150	1,576	1,402	558
1919–20	368,002	74,529	7,035	52	449,573	336,336	114,066	86,857	1,051	1,619	722
1920–21	203,815	106,415	5,570	53	454,701	391,264	57,461	24,492	2,665	2,001	292
1921–22	222,462	117,174	6,592	126	532,721	484,059	109,398	49,639	1,094	1,641	1,001
1922–23	194,912	104,956	5,205	48	454,350	574,612	79,229	93,962	1,756	1,799	375
1923–24	185,372	92,965	5,784	115	250,366	560,114	136,448	88,152	4,098	2,592	135
1924–25	190,211	105,145	8,239	200	885,375	691,126	171,771	90,783	3,201	2,197	251
1925–26	152,320	90,410	8,110	102	716,505	589,166	151,405	135,027	3,672	2,253	300
1926–27	151,531	92,720	11,281	278	990,516	625,121	175,544	152,337	7,098	3,340	114
1927–28	106,595	64,851	7,890	230	664,523	606,304	260,625	193,099	3,144	2,988	106
1928–29	101,303	63,187	8,520	219	571,200	645,120	273,051	221,756	7,014	4,223	128
1929–30	102,080	61,088	7,096	143	338,240	624,960	142,989	128,697	3,426	3,674	79
1930–31[3]	98,379	54,961	7,048	132	87,360	304,640	296,254	125,100	6,780	3,984	70

Footnotes at end of table.

TABLE 441.—*Exports of selected domestic agricultural products, averages 1899–1900 to 1908–09, annual 1909–10 to 1930–31*—Continued

Year beginning July—	Barley, including flour and malt[7]	Corn, including corn meal	Oats, including oatmeal	Rice, including flour, meal, and broken rice	Rye, including flour	Wheat, including flour	Tobacco, unmanufactured[8]	Glucose and grape sugar	Hops	Starch, including cornstarch
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 pounds*	*1,000 bushels*	*1,000 bushels*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Average: 1899–1900 to 1903–4	11, 931	111, 484	22, 188	3, 511	2, 734	196, 690	328, 321	167, 108	11, 420	68, 173
1904–5 to 1908–9	9, 907	77, 857	13, 614	17, 009	1, 186	116, 181	321, 197	151, 690	15, 613	52, 143
1909–10	4, 454	38, 128	2, 549	7, 050	242	89, 173	357, 196	149, 820	10, 589	51, 536
1910–11	9, 507	65, 615	3, 846	15, 575	40	71, 338	355, 327	181, 963	13, 105	158, 239
1911–12	1, 655	41, 797	2, 678	26, 798	31	81, 891	379, 845	171, 156	12, 191	83, 645
1912–13	17, 874	50, 780	36, 455	24, 801	1, 855	145, 159	418, 797	200, 149	17, 591	110, 898
1913–14	6, 945	10, 726	2, 749	18, 223	2, 273	147, 955	449, 750	199, 531	24, 263	76, 714
1914–15	28, 712	50, 668	100, 609	75, 449	13, 027	335, 702	348, 346	158, 463	16, 210	107, 037
1915–16	30, 821	39, 897	98, 960	120, 695	15, 250	, 246, 221	443, 293	186, 406	22, 410	210, 185
1916–17	20, 319	66, 753	95, 106	181, 372	13, 703	205, 962	411, 599	214, 973	4, 825	146, 424
1917–18	28, 717	49, 073	125, 091	196, 363	17, 186	132, 579	289, 171	97, 858	3, 495	73, 883
1918–19	26, 997	23, 019	109, 005	193, 128	36, 467	287, 402	629, 288	136, 230	7, 467	143, 788
1919–20	34, 555	16, 729	43, 436	483, 385	41, 531	222, 030	648, 038	245, 264	30, 780	237, 609
1920–21	27, 255	70, 906	9, 391	440, 855	47, 337	369, 313	506, 526	141, 954	22, 206	135, 365
1921–22	27, 543	179, 490	21, 237	541, 509	29, 944	282, 566	463, 389	273, 982	19, 522	386, 873
1922–23	21, 909	96, 596	25, 413	370, 670	51, 663	224, 900	454, 364	162, 693	13, 497	260, 796
1923–24	13, 913	23, 135	8, 796	227, 757	19, 902	159, 880	597, 630	148, 051	20, 461	262, 842
1924–25	28, 543	9, 791	16, 777	112, 037	50, 242	260, 803	430, 702	139, 577	16, 122	214, 247
1925–26	30, 449	24, 783	39, 687	48, 175	12, 647	108, 035	537, 240	170, 142	14, 998	224, 569
1926–27	19, 655	19, 819	15, 041	304, 358	21, 697	219, 160	516, 401	148, 789	13, 369	233, 111
1927–28	39, 274	19, 409	9, 823	309, 788	26, 346	206, 259	489, 996	145, 951	11, 812	281, 388
1928–29	60, 295	41, 876	16, 251	392, 684	9, 488	163, 687	565, 925	123, 366	8, 836	235, 660
1929–30	24, 054	10, 270	7, 966	289, 532	2, 598	153, 247	600, 180	101, 816	6, 793	203, 343
1930–31[3]	11, 443	3, 317	3, 123	281, 005	227	131, 477	591, 020	70, 571	5, 593	104, 807

Year beginning July—	Cornstarch[9]	Apples, dried	Apricots, dried	Apricots, canned[10]	Pears, canned[10]	Peaches, canned[10]	Pineapples, canned[10]	Grapes	Pears, fresh[10]	Grapefruit, fresh
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 boxes*
1912–13	-------	41, 575	35, 017	-------	-------	-------	-------	-------	-------	-------
1913–14	-------	33, 566	17, 402	-------	-------	-------	-------	-------	-------	-------
1914–15	-------	42, 589	23, 764	-------	-------	-------	-------	-------	-------	-------
1915–16	-------	16, 219	23, 940	-------	-------	-------	-------	-------	-------	-------
1916–17	-------	10, 358	9, 841	-------	-------	-------	-------	-------	-------	-------
1917–18	38, 659	2, 603	5, 230	-------	-------	-------	-------	-------	-------	-------
1918–19	106, 727	18, 909	20, 975	-------	-------	-------	-------	-------	-------	-------
1919–20	163, 315	11, 819	26, 768	-------	-------	-------	-------	-------	-------	-------
1920–21	110, 514	18, 053	8, 332	-------	-------	-------	-------	-------	-------	-------
1921–22	348, 940	12, 431	16, 736	-------	-------	-------	-------	[11] 173	-------	[11] 140
1922–23	254, 060	12, 817	11, 193	[11] 13, 809	49, 358	54, 624	21, 848	14, 022	36, 785	252
1923–24	255, 135	30, 323	38, 777	26, 576	38, 431	50, 374	25, 238	20, 257	50, 237	305
1924–25	209, 865	19, 225	13, 292	31, 360	53, 851	57, 390	26, 252	20, 302	41, 452	427
1925–26	208, 463	24, 833	18, 132	29, 547	75, 876	83, 160	37, 543	24, 268	71, 205	379
1926–27	212, 375	32, 670	17, 901	35, 896	66, 104	81, 896	37, 426	30, 791	73, 877	613
1927–28	275, 921	21, 704	23, 684	29, 013	52, 671	86, 634	51, 227	38, 819	51, 056	719
1928–29	231, 667	50, 024	24, 652	26, 249	82, 652	101, 438	47, 533	55, 638	82, 847	940
1929–30	200, 558	23, 769	19, 101	33, 235	54, 709	74, 470	46, 309	46, 158	62, 024	854
1930–31[3]	102, 886	38, 121	23, 647	19, 024	74, 354	75, 763	35, 308	49, 799	134, 670	1, 222

Bureau of Agricultural Economics. Compiled from Foreign Commerce and Navigation of the United States, 1900–1918, and Monthly Summary of Foreign Commerce of the United States, June issues 1921–1931.

Conversion factors used: Corn meal, 1 barrel=4 bushels corn; oatmeal, 18 pounds=1 bushel oats; rye flour, 1 barrel=6 bushels rye; malt, 1.1 bushels=1 bushel barley; wheat flour, 1 barrel=1900–1908, 4.75 bushels grain; 1909–1917, 4.7 bushels; 1918 and 1919, 4.5 bushels; 1920, 4.6 bushels; 1921–1931, 4.7 bushels. Apples, 3 boxes=1 barrel.

[1] Includes canned, fresh, salted, or pickled pork, lard, neutral lard, lard oil, bacon, and hams.
[2] Reported in value only.
[3] Preliminary.
[4] Includes canned, cured, and fresh beef, oleo oil, oleo stock, oleomargarine, tallow, and stearin from animal fats.
[5] Bales of 500 pounds gross; lint cotton and linters not separately reported prior to 1915.
[6] Includes maple sugar, 1919–1931.
[7] Includes barley flour 1919–1922. Barley flour not separately reported prior to 1919 nor since 1922.
[8] Includes "Stems, trimmings, and scrap tobacco."
[9] Included with "Starch" prior to 1918.
[10] Given in value only prior to 1923.
[11] Jan. 1 to June 30.

TABLE 442.—*Imports of selected agricultural products, averages 1899–1900 to 1908–09, annual 1909–10 to 1930–31*

Year beginning July—	Butter	Cheese	Beef and veal, fresh	Cattle hides	Goat-skins	Total hides and skins (except furs)	Silk [1]	Cotton, unmanufactured	Wool, unmanufactured, including mohair, etc.	Total, tobacco, unmanufactured
Average:	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
1899–1900 to 1903–4	192	17,846	(2)	131,736	83,047	309,360	13,942	67,292	155,394	28,216
1904–5 to 1908–9	532	30,462	(2)	138,922	95,555	372,292	20,061	78,771	209,413	38,688
1909–10	1,360	40,818	(2)	318,004	115,845	608,619	23,457	86,038	263,928	46,853
1910–11	1,008	45,569	(2)	150,128	86,914	374,891	26,666	113,768	137,648	48,203
1911–12	1,026	46,542	(2)	251,012	95,341	537,768	26,585	109,780	193,401	54,740
1912–13	1,162	49,388	(2)	268,042	96,250	572,197	32,101	121,852	195,293	67,977
1913–14	7,842	63,784	180,137	279,963	84,759	561,071	34,546	123,347	247,649	61,175
1914–15	3,828	50,139	184,491	344,341	66,547	538,218	31,053	185,205	308,083	45,809
1915–16	713	30,088	71,102	434,178	100,657	743,670	41,925	232,801	534,828	48,078
1916–17	524	14,482	15,217	386,600	105,640	700,207	40,351	147,062	372,372	49,105
1917–18	1,806	9,839	25,452	267,500	66,933	432,517	43,681	103,326	379,130	86,991
1918–19	4,131	2,442	36,670	253,877	89,005	448,142	50,069	103,592	422,415	83,951
1919–20	20,771	17,914	42,436	439,461	126,996	798,569	58,410	345,314	427,578	94,005
1920–21	34,344	16,585	41,956	198,573	41,728	352,193	34,778	125,939	318,236	58,923
1921–22	9,551	34,271	28,001	204,936	83,535	392,904	57,437	179,165	255,087	65,225
1922–23	15,772	54,555	32,481	405,383	89,401	682,893	63,188	236,092	525,473	75,786
1923–24	29,466	66,597	25,144	176,475	65,881	365,194	56,595	146,024	239,122	54,497
1924–25	7,189	61,489	12,419	199,310	65,956	387,447	70,270	155,092	284,706	76,870
1925–26	6,440	62,412	18,279	155,587	86,484	355,266	76,838	161,454	345,512	69,974
1926–27	10,710	89,782	22,098	156,938	83,571	368,876	85,162	190,963	271,128	92,983
1927–28	4,955	75,424	47,650	307,362	84,751	532,379	87,128	175,450	248,035	81,045
1928–29	3,299	84,606	62,481	216,348	94,486	447,384	90,662	227,454	270,937	79,284
1929–30	2,851	78,261	30,190	294,832	101,120	548,567	87,408	197,657	220,476	63,181
1930–31 [3]	1,329	57,972	3,551	91,107	80,830	265,936	87,861	51,192	149,557	75,426

Year beginning July—	Rubber and similar gums, crude, total	Coffee	Tea	Cocoa or cacao beans	Bananas	Olives	Lemons	Onions	Tomatoes, fresh	Beans, dry
Average:	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 bunches*	*1,000 gallons*	*1,000 boxes*	*1,000 bushels*	*1,000 pounds*	*1,000 bushels*
1899–1900 to 1903–4	66,973	928,799	94,342	54,936	(4)	(4)	2,153	843	(4)	1,002
1904–5 to 1908–9	95,054	965,058	98,353	91,774	[5] 36,988	[6] 2,796	2,025	941	(4)	1,270
1909–10	154,621	871,470	85,626	108,668	38,157	4,555	2,165	1,024	(2)	1,015
1910–11	145,744	875,367	102,564	138,058	44,699	3,045	1,824	1,515	(2)	1,037
1911–12	175,966	885,201	101,407	145,969	44,521	5,077	1,963	1,436	(2)	1,005
1912–13	170,747	863,131	94,813	140,039	42,357	3,946	2,046	789	(2)	1,048
1913–14	161,777	1,001,528	91,131	176,268	48,684	5,316	(4)	1,115	(2)	1,634
1914–15	196,122	1,118,691	96,988	192,307	41,092	3,622	(4)	829	(2)	906
1915–16	304,183	1,201,104	109,866	243,232	36,755	5,938	(4)	816	(2)	663
1916–17	364,914	1,319,871	103,364	338,654	34,661	5,642	(4)	1,758	(2)	3,748
1917–18	414,984	1,143,891	151,315	399,040	34,550	2,385	(4)	1,313	(2)	4,146
1918–19	422,215	1,046,029	108,172	313,037	35,382	3,501	(4)	152	(2)	4,016
1919–20	660,610	1,414,228	97,826	420,331	36,848	5,206	(4)	1,884	(2)	3,806
1920–21	371,300	1,348,926	72,196	327,123	40,808	4,054	(4)	689	(2)	824
1921–22	578,512	1,238,012	86,142	317,124	46,120	(4)	1,373	2,488	(2)	520
1922–23	810,028	1,305,188	96,669	381,508	44,504	(4)	1,660	1,783	(2)	2,623
1923–24	633,489	1,429,617	105,443	382,971	44,935	6,848	1,018	1,406	[7] 50,838	886
1924–25	824,434	1,279,570	92,779	382,570	50,513	5,901	1,264	2,075	69,216	1,421
1925–26	962,659	1,437,364	99,411	417,060	58,550	5,992	1,247	2,194	82,448	1,271
1926–27	993,272	1,444,847	97,402	425,184	57,102	5,212	659	2,298	124,489	1,051
1927–28	959,245	1,535,392	90,099	411,543	64,029	6,458	1,308	1,399	113,357	2,465
1928–29	1,252,130	1,435,070	92,635	419,243	63,530	6,955	391	2,050	128,627	1,505
1929–30	1,157,817	1,562,058	86,368	421,938	65,909	8,452	1,229	918	139,886	2,534
1930–31 [3]	1,048,758	1,728,569	87,148	415,442	57,841	7,429	350	214	113,480	1,346

Footnotes at end of table.

TABLE 442.—*Imports of selected agricultural products, averages 1899–1900 to 1908–9, annual 1909–10 to 1930–31*—Continued

Year beginning July—	Almonds in terms of shelled [8]	Peanuts in terms of shelled [8]	Walnuts in terms of shelled [8]	Coconut meat [9]	Flaxseed	Sugar, raw and refined	Molasses	Jute and jute butts, unmanufactured	Manila or abaca	Sisal and henequen
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 bushels*	*1,000 short tons*	*1,000 gallons*	*1,000 long tons*	*1,000 long tons*	*1,000 long tons*
Average: 1899–1900 to 1903–4	7,862	(10)	[4] 18,017	(10)	504	1,894	13,788	102	54	87
1904–5 to 1908–9	13,832	(10)	26,849	[6] 15,010	218	1,961	20,221	114	58	98
1909–10	18,556	29,276	33,641	21,306	5,002	2,047	31,292	68	93	100
1910–11	15,523	18,834	33,619	37,817	10,499	1,969	23,838	65	74	118
1911–12	17,231	11,248	37,214	69,912	6,842	2,052	28,828	101	69	114
1912–13	13,856	14,989	17,213	40,870	5,294	2,370	33,927	125	74	154
1913–14	15,027	38,726	20,800	55,735	8,653	2,533	51,410	106	50	216
1914–15	13,679	19,338	20,490	96,485	10,666	2,710	70,840	83	51	186
1915–16	14,546	25,407	23,733	118,613	14,679	2,817	85,717	108	79	229
1916–17	19,916	32,385	23,839	256,801	12,394	2,666	110,238	113	77	143
1917–18	20,845	75,463	16,252	507,576	13,367	2,452	130,731	78	86	150
1918–19	25,615	20,425	9,057	315,749	8,427	2,918	130,075	53	68	153
1919–20	28,533	128,390	28,961	258,229	23,392	3,798	154,670	77	77	176
1920–21	15,861	46,202	15,902	213,134	16,170	3,506	113,414	90	52	159
1921–22	28,036	9,678	35,174	294,104	13,632	4,232	87,908	62	44	72
1922–23	24,345	45,013	25,970	338,597	25,006	4,367	161,135	85	98	98
1923–24	24,207	50,683	26,428	344,920	19,577	3,765	174,037	84	98	97
1924–25	22,503	93,191	36,623	371,961	13,419	4,337	215,778	56	73	146
1925–26	19,686	36,026	31,698	444,278	19,354	4,420	256,246	71	62	126
1926–27	15,890	49,792	31,776	507,136	24,224	4,420	260,259	89	61	116
1927–28	18,496	63,783	20,347	518,173	18,112	4,045	248,427	81	48	124
1928–29	18,673	30,412	24,500	687,121	23,494	4,753	296,550	92	60	135
1929–30	19,956	9,941	20,228	546,888	19,652	3,641	253,114	80	73	113
1930–31 [3]	13,264	9,002	17,818	606,087	7,813	3,288	217,001	49	43	84

Year beginning July—	Milk and cream, fresh	Cream, fresh	Eggs, whole, in the shell	Eggs and egg yolks, dried, frozen, or prepared	Whole eggs, dried	Whole eggs, frozen	Yolks, dried	Yolks, frozen	Egg albumen, dried	Egg albumen, frozen, prepared and preserved	Hair of the Angora (mohair)
	1,000 gallons	*1,000 gallons*	*1,000 dozen*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
1912–13	(2)	1,247	1,367	228	-------	-------	-------	-------	(2)	-------	-------
1913–14	(2)	1,773	6,015	3,420	-------	-------	-------	-------	(2)	-------	-------
1914–15	(2)	2,077	3,047	8,572	-------	-------	-------	-------	(2)	-------	-------
1915–16	(2)	1,194	733	6,022	-------	-------	-------	-------	(2)	-------	-------
1916–17	(2)	744	1,110	10,318	-------	-------	-------	-------	(2)	-------	-------
1917–18	(2)	712	1,619	14,598	-------	-------	-------	-------	(2)	-------	-------
1918–19	2,592	(2)	848	9,085	-------	-------	-------	-------	(2)	-------	-------
1919–20	3,989	(2)	1,348	24,091	-------	-------	-------	-------	(2)	-------	-------
1920–21	4,391	(2)	3,316	28,768	-------	-------	-------	-------	(2)	-------	-------
1921–22	4,536	(2)	1,224	16,540	-------	-------	-------	-------	7,388	-------	-------
1922–23	5,148	(2)	535	14,821	-------	-------	-------	-------	3,213	-------	[11] 7,220
1923–24	6,623	[7] 1,646	426	[12] 14,830	[7] 544	[7] 1,106	[7] 522	[7] 1,210	6,642	[7] 636	3,583
1924–25	6,418	4,765	682	-------	1,884	8,751	4,281	4,151	3,257	1,106	2,404
1925–26	7,479	4,798	276	-------	1,365	12,647	6,004	5,662	4,490	5,119	6,463
1926–27	6,106	5,273	296	-------	1,132	8,114	4,468	4,601	3,859	3,967	6,547
1927–28	5,425	4,819	256	-------	575	611	3,486	1,229	2,361	553	2,204
1928–29	5,016	3,173	291	-------	2,133	12,616	5,130	4,581	2,898	610	3,134
1929–30	3,314	2,474	337	-------	1,839	9,824	7,819	3,475	4,363	9,955	1,073
1930–31 [3]	1,190	844	301	-------	822	113	6,069	1,052	2,219	2	474

Bureau of Agricultural Economics. Compiled from Commerce and Navigation of the United States 1900–1918, and Monthly Summary of Foreign Commerce, June issue, 1919–1931.

1 Includes "Silk, raw or as reeled from cocoon," "Silk waste," and "Silk cocoons."
2 Not separately classified.
3 Preliminary.
4 Reported in value only.
5 2-year average.
6 3-year average.
7 Beginning Jan. 1, 1924.
8 Conversion factors used: Almonds, 30 per cent unshelled equals shelled. Peanuts, 3 pounds unshelled equals 2 pounds shelled. Walnuts, 42 per cent unshelled equals shelled.
9 Includes broken, or shredded, desiccated or prepared and copra.
10 Included with "All other nuts."
11 Beginning Sept. 22, 1922.
12 July 1–Dec. 31, 1923.

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927–28 to 1930–31*

Article and country to which exported	Year beginning July							
	Quantity				Per cent of total			
	1927–28	1928–29	1929–30	1930–31[1]	1927–28	1928–29	1929–30	1930–31[1]
ANIMALS AND ANIMAL PRODUCTS								
Butter:	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Mexico	724	672	617	426	18.3	18.0	17.2	18.4
Cuba	479	370	96	6	12.1	9.8	2.7	.3
Haiti, Republic of	479	479	458	394	12.1	12.7	12.8	17.0
Other West Indies[2]	391	394	380	261	9.9	10.4	10.6	11.3
Peru	358	451	371	67	9.0	11.9	10.4	2.9
Other South America	390	485	492	351	9.8	12.8	13.7	15.2
Panama	311	227	342	157	7.8	6.0	9.5	6.8
Philippine Islands	190	152	210	154	4.8	4.0	5.9	6.6
Other countries	643	548	616	500	16.2	14.4	17.2	21.5
Total	3,965	3,778	3,582	2,316	100.0	100.0	100.0	100.0
Cheese:								
Mexico	581	423	506	293	20.2	16.4	21.6	16.9
Panama	432	460	485	442	15.0	17.9	20.7	25.5
Other Central America	293	294	289	233	10.2	11.4	12.4	13.4
Cuba	359	405	170	72	12.5	15.7	7.3	4.2
Other West Indies[2]	331	360	252	207	11.5	14.0	10.8	11.9
Canada	259	170	176	179	9.0	6.6	7.5	10.3
China	145	89	45	29	5.0	3.5	1.9	1.7
Other countries	473	371	416	278	16.6	14.5	17.8	16.1
Total	2,873	2,572	2,339	1,733	100.0	100.0	100.0	100.0
Milk:								
Condensed—								
Total Europe	151	70	21	14	.4	.2	.1	.1
Cuba	11,462	13,103	13,196	3,651	31.0	33.1	34.9	15.9
Philippine Islands	7,575	7,339	7,347	7,566	20.5	18.5	19.5	33.0
Japan	5,385	5,473	4,701	4,167	14.6	13.8	12.4	18.2
Hong Kong	3,764	3,739	3,905	2,372	10.2	9.5	10.3	10.3
China	2,513	2,840	2,173	1,319	6.8	7.2	5.8	5.8
Mexico	985	883	1,055	605	2.7	2.2	2.8	2.6
Other countries	5,140	6,118	5,373	3,240	13.8	15.5	14.2	14.1
Total	36,975	39,565	37,771	22,934	100.0	100.0	100.0	100.0
Evaporated—								
United Kingdom	23,805	21,759	11,877	15,978	33.1	29.9	18.6	28.5
Belgium	389	265	25	11	.5	.4	0	0
Germany	16	71	11	69	0	.1	0	.1
Other Europe	191	172	421	287	.3	.1	.7	.6
Total Europe	24,401	22,267	12,334	16,345	33.9	30.5	19.3	29.2
Philippine Islands	15,563	16,372	17,153	18,684	21.6	22.5	26.9	33.3
Panama	3,589	4,606	4,805	2,898	5.0	6.3	7.5	5.2
Peru	3,569	4,027	3,602	1,583	5.0	5.5	5.6	2.8
China	3,035	3,447	2,056	816	4.2	4.7	3.2	1.5
British Malaya	2,817	2,761	3,359	1,026	3.9	3.8	5.3	1.8
Cuba	2,647	2,272	2,935	486	3.7	3.1	4.6	.9
Japan	2,466	2,544	2,785	2,867	3.4	3.5	4.4	5.1
Mexico	2,157	2,185	2,274	1,296	3.0	3.0	3.6	2.3
Other countries	11,724	12,413	12,498	10,051	16.3	17.1	19.6	17.9
Total	71,968	72,894	63,801	56,052	100.0	100.0	100.0	100.0
Bacon, including Cumberland sides:								
United Kingdom	50,127	53,364	57,443	26,203	39.5	41.3	43.2	50.0
Germany	9,838	5,982	8,468	1,151	7.7	4.6	6.4	2.2
Italy	8,113	15,106	8,289	764	6.4	11.7	6.2	1.5
Finland	6,075	4,633	3,734	1,549	4.8	3.6	2.8	3.0
Norway	3,244	2,742	2,642	712	2.6	2.1	2.0	1.4
Netherlands	632	1,198	2,959	61	.5	.9	2.2	.1
Other Europe	21,525	20,210	22,854	4,972	16.9	15.7	17.2	9.4
Total Europe	99,554	103,235	106,389	35,412	78.4	79.9	80.0	67.6
Cuba	19,107	16,698	17,253	12,398	15.0	12.9	13.0	23.7
Canada	5,173	5,769	5,617	2,335	4.1	4.5	4.2	4.5
Other countries	3,133	3,546	3,708	2,267	2.5	2.7	2.8	4.2
Total	126,967	129,248	132,967	52,412	100.0	100.0	100.0	100.0

[1] Preliminary. [2] Excludes Bermuda.

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927–28 to 1930–31*—Continued

Article and country to which exported	Year beginning July							
	Quantity				Per cent of total			
	1927–28	1928–29	1929–30	1930–31	1927–28	1928–29	1929–30	1930–31
ANIMALS AND ANIMAL PRODUCTS—continued								
Hams and shoulders, including Wiltshire sides:	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
United Kingdom	104, 020	100, 959	103, 169	81, 294	81. 4	80. 5	79. 2	81. 5
Belgium	660	1, 003	2, 136	1, 464	. 5	. 8	1. 6	1. 5
Other Europe	1, 846	2, 024	1, 155	236	1. 4	1. 6	. 9	. 2
Total Europe	106, 526	103, 986	106, 460	82, 994	83. 3	82. 9	81. 7	83. 2
Cuba	8, 167	7, 435	5, 053	4, 272	6. 4	5. 9	3. 9	4. 3
Canada	6, 134	6, 309	11, 370	5, 895	4. 8	5. 0	8. 7	5. 9
Other countries	6, 992	7, 666	7, 435	6, 588	5. 5	6. 2	5. 7	6. 6
Total	127, 819	125, 396	130, 318	99, 749	100. 0	100. 0	100. 0	100. 0
Pork:								
Canned—								
United Kingdom	7, 632	6, 555	10, 737	9, 066	88. 6	82. 2	84. 0	85. 9
Other Europe	97	145	238	193	1. 1	1. 8	1. 9	1. 8
Total Europe	7, 729	6, 700	10, 975	9, 259	89. 7	84. 0	85. 9	87. 7
Other countries	885	1, 274	1, 808	1, 293	10. 3	16. 0	14. 1	12. 3
Total	8, 614	7, 974	12, 783	10, 552	100. 0	100. 0	100. 0	100. 0
Fresh—								
United Kingdom	6, 418	4, 547	10, 527	8, 098	58. 0	42. 7	56. 1	73. 0
Other Europe	1, 002	2, 515	3, 685	464	9. 1	23. 7	19. 6	4. 2
Total Europe	7, 420	7, 062	14, 212	8, 562	67. 1	66. 4	75. 7	77. 2
Cuba	1, 557	1, 732	1, 618	424	14. 1	16. 3	8. 6	3. 8
Canada	798	582	1, 091	410	7. 2	5. 5	5. 8	3. 7
Other countries	1, 284	1, 265	1, 847	1, 697	11. 6	11. 8	9. 9	15. 3
Total	11, 059	10, 641	18, 768	11, 093	100. 0	100. 0	100. 0	100. 0
Pickled—								
United Kingdom	5, 184	7, 608	5, 094	2, 945	16. 4	19. 1	12. 8	13. 9
Norway	722	854	799	364	2. 3	2. 1	2. 0	1. 7
Germany	289	366	328	89	. 9	. 9	. 8	. 4
Other Europe	821	1, 420	1, 194	327	2. 6	3. 6	3. 0	1. 6
Total Europe	7, 016	10, 248	7, 415	3, 725	22. 2	25. 7	18. 6	17. 6
Cuba	7, 626	10, 550	9, 774	4, 862	24. 1	26. 4	24. 6	23. 0
Canada	7, 056	8, 596	11, 211	4, 356	22. 3	21. 5	28. 2	20. 6
Newfoundland and Labrador	3, 734	4, 530	4, 792	3, 681	11. 8	11. 4	12. 0	17. 4
British West Indies and Bermudas	2, 851	2, 810	221	2, 226	9. 0	7. 0	. 6	10. 5
Haiti, Republic of	1, 055	838	719	544	3. 3	2. 1	1. 8	2. 6
Other countries	2, 312	2, 334	5, 677	1, 724	7. 3	5. 9	14. 2	8. 3
Total	31, 650	39, 906	39, 809	21, 118	100. 0	100. 0	100. 0	100. 0
Lard:								
United Kingdom	233, 564	229, 899	240, 147	256, 353	32. 6	29. 4	30. 5	43. 8
Germany	176, 771	195, 695	180, 074	107, 317	24. 7	25. 1	22. 9	18. 3
Netherlands	35, 784	36, 992	48, 584	26, 478	5. 0	4. 7	6. 2	4. 5
Italy	20, 384	29, 200	19, 865	6, 064	2. 8	3. 7	2. 5	1. 0
Belgium	14, 541	14, 841	18, 700	9, 406	2. 0	1. 9	2. 4	1. 6
Other Europe	38, 144	49, 070	56, 031	14, 791	5. 4	6. 4	7. 1	2. 6
Total Europe	519, 188	555, 697	563, 401	420, 409	72. 5	71. 2	71. 6	71. 8
Cuba	78, 469	84, 316	79, 860	49, 004	11. 0	10. 8	10. 1	8. 4
Other countries	118, 741	140, 901	143, 899	116, 257	16. 5	18. 0	18. 3	19. 8
Total	716, 398	780, 914	787, 160	585, 670	100. 0	100. 0	100. 0	100. 0

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927–28 to 1930–31*—Continued

Article and country to which exported	Year beginning July							
	Quantity				Per cent of total			
	1927–28	1928–29	1929–30	1930–31	1927–28	1928–29	1929–30	1930–31
ANIMAL AND ANIMAL PRODUCTS—continued								
Lard, neutral:	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Netherlands	6,784	4,710	6,260	3,264	28.5	25.7	37.3	30.3
Germany	5,623	4,023	3,010	1,421	23.6	22.0	17.9	13.2
United Kingdom	5,096	3,919	2,320	1,526	21.4	21.4	13.8	14.2
Norway	1,228	895	755	529	5.2	4.9	4.5	4.9
Denmark	1,176	894	1,379	1,453	4.9	4.9	8.2	13.5
Sweden	696	649	787	766	2.9	3.5	4.7	7.1
Other Europe	1,206	1,463	1,197	1,015	5.1	8.0	7.2	9.5
Total Europe	21,809	16,553	15,708	9,974	91.6	90.4	93.6	92.7
Other countries	1,990	1,762	1,075	785	8.4	9.6	6.4	7.3
Total	23,799	18,315	16,783	10,759	100.0	100.0	100.0	100.0
Oleo oil:								
Germany	18,267	16,835	14,630	13,934	28.2	26.6	23.9	25.4
Netherlands	17,608	16,744	22,158	15,868	27.2	26.5	36.3	28.9
United Kingdom	16,092	16,328	11,735	13,179	24.8	25.8	19.2	24.0
Norway	3,596	2,763	2,549	2,018	5.5	4.4	4.2	3.7
Greece	454	602	750	1,587	.7	1.0	1.2	2.9
Other Europe	5,594	6,209	6,218	6,053	8.6	9.8	10.2	10.9
Total Europe	61,611	59,481	58,040	52,639	95.0	94.1	95.0	95.8
Other countries	3,240	3,706	3,048	2,322	5.0	5.9	5.0	4.2
Total	64,851	63,187	61,088	54,961	100.0	100.0	100.0	100.0
VEGETABLE PRODUCTS	*1,000 bales* [3]	*1,000 bales* [3]	*1,000 bales* [3]	*1,000 bales* [3]				
Cotton, excluding linters:								
Germany	2,090	1,891	1,770	1,752	26.5	22.2	24.9	24.9
United Kingdom	1,443	1,918	1,306	1,108	18.3	22.5	18.4	15.7
France	904	841	860	986	11.5	9.9	12.1	14.0
Italy	708	765	705	495	9.0	9.0	9.9	7.0
Other Europe	1,283	1,183	926	772	16.2	13.8	13.2	10.9
Total Europe	6,428	6,598	5,567	5,113	81.5	77.4	78.5	72.5
Japan	1,007	1,373	1,071	1,233	12.8	16.1	15.1	17.5
Other countries	455	549	458	702	5.7	6.5	6.4	10.0
Total	7,890	8,520	7,096	7,048	100.0	100.0	100.0	100.0
Linters:								
Germany	132	120	70	56	57.1	54.8	49.0	42.4
France	36	32	26	27	15.6	14.6	18.2	20.5
United Kingdom	22	16	7	11	9.5	7.3	4.9	8.3
Belgium	7	12	8	5	3.0	5.5	5.6	3.8
Other Europe	15	18	14	14	6.6	8.2	9.7	10.6
Total Europe	212	198	125	113	91.8	90.4	87.4	85.6
Canada	18	19	17	16	7.8	8.7	11.9	12.1
Other countries	1	2	1	3	.4	.9	.7	2.3
Total	231	219	143	132	100.0	100.0	100.0	100.0
Fruits:								
Dried—	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*				
Apples—								
Germany	10,877	22,085	11,425	18,470	50.1	44.1	48.1	48.5
Netherlands	3,315	12,451	4,323	8,763	15.3	24.9	18.2	23.0
Sweden	2,524	2,985	3,015	1,846	11.6	6.0	12.7	4.8
Denmark	1,384	1,674	894	1,161	6.4	3.3	3.8	3.0
United Kingdom	1,018	2,618	1,522	1,755	4.7	5.2	6.4	4.6
Other Europe	1,617	6,995	1,880	5,598	7.4	14.1	7.8	14.7
Total Europe	20,735	48,808	23,059	37,593	95.5	97.6	97.0	98.6
Other countries	969	1,216	710	528	4.5	2.4	3.0	1.4
Total	21,704	50,024	23,769	38,121	100.0	100.0	100.0	100.0

[3] Bales of 500 pounds.

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927–28 to 1930–31*—Continued

Article and country to which exported	Year beginning July							
	Quantity				Per cent of total			
	1927–28	1928–29	1929–30	1930–31	1927–28	1928–29	1929–30	1930–31
VEGETABLE PRODUCTS—continued								
Fruits—Continued.								
Dried—Continued.	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Apricots—								
Germany	6,512	7,742	6,091	8,695	27.5	31.4	31.9	36.8
Netherlands	4,651	3,750	2,493	2,933	19.6	15.2	13.1	12.4
United Kingdom	1,964	1,422	1,019	1,243	8.3	5.8	5.3	5.3
Belgium	1,374	1,691	891	1,932	5.8	6.9	4.7	8.2
Norway	1,260	988	1,327	786	5.3	4.0	6.9	3.3
Sweden	994	776	939	835	4.2	3.1	4.9	3.5
Other Europe	4,403	5,910	4,104	5,568	18.6	24.0	21.5	23.5
Total Europe	21,158	22,279	16,864	21,992	89.3	90.4	88.3	93.0
Canada	1,920	1,614	1,431	1,036	8.1	6.5	7.5	4.4
Other countries	606	759	806	619	2.6	3.1	4.2	2.6
Total	23,684	24,652	19,101	23,647	100.0	100.0	100.0	100.0
Prunes:								
Germany	79,732	77,883	44,789	97,631	30.6	28.5	31.3	33.0
United Kingdom	45,601	40,836	28,143	39,824	17.5	15.0	19.7	13.4
France	27,390	59,822	9,298	46,571	10.5	21.9	6.5	15.7
Netherlands	23,140	17,286	5,584	18,903	8.9	6.3	3.9	6.4
Sweden	7,047	5,434	6,744	8,712	2.7	2.0	4.7	2.9
Other Europe	40,664	39,533	22,299	56,174	15.6	14.5	15.6	19.0
Total Europe	223,574	240,794	116,857	267,815	85.8	88.2	81.7	90.4
Canada	23,272	18,965	16,187	16,456	8.9	6.9	11.3	5.6
Other countries	13,779	13,292	9,945	11,983	5.3	4.9	7.0	4.0
Total	260,625	273,051	142,989	296,254	100.0	100.0	100.0	100.0
Raisins:								
United Kingdom	70,034	71,375	36,443	40,293	36.3	32.2	28.3	32.2
Germany	18,733	23,022	14,059	14,628	9.7	10.4	10.9	11.7
Netherlands	18,598	24,278	7,436	8,827	9.6	10.9	5.8	7.1
Denmark	1,593	2,244	1,286	1,385	.8	1.0	1.0	1.1
Other Europe	22,967	31,866	18,391	19,807	11.9	14.4	14.3	15.8
Total Europe	131,925	152,785	77,615	84,940	68.3	68.9	60.3	67.9
Canada	40,148	39,635	28,668	22,894	20.8	17.9	22.3	18.3
China	4,144	7,574	4,791	1,816	2.1	3.4	3.7	1.5
Japan	3,086	2,961	2,992	2,140	1.6	1.3	2.3	1.7
Other countries	13,796	18,801	14,631	13,310	7.2	8.5	11.4	10.6
Total	193,099	221,756	128,697	125,100	100.0	100.0	100.0	100.0
Fresh—	*1,000 barrels*	*1,000 barrels*	*1,000 barrels*	*1,000 barrels*				
Apples—								
United Kingdom	1,004	1,720	953	954	74.4	57.2	66.8	38.5
Germany	27	236	50	404	2.0	7.9	3.5	16.3
Netherlands	2	201	17	334	.2	6.7	1.2	13.5
Belgium	1	321	14	313	.1	10.7	1.0	12.6
Other Europe	150	308	175	263	11.1	10.2	12.2	10.6
Total Europe	1,184	2,786	1,209	2,268	87.8	92.7	84.7	91.5
Other countries	165	219	218	211	12.2	7.3	15.3	8.5
Total	1,349	3,005	1,427	2,479	100.0	100.0	100.0	100.0
	1,000 boxes	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*				
Apples—								
United Kingdom	2,709	4,836	2,655	3,991	50.3	40.2	44.3	30.9
Germany	737	2,695	946	3,476	13.7	22.4	15.8	26.9
Netherlands	72	1,687	272	2,417	1.3	14.0	4.5	18.7
Other Europe	507	839	598	1,501	9.5	7.0	9.9	11.7
Total Europe	4,025	10,057	4,471	11,385	74.8	83.6	74.5	88.2
Canada	542	636	500	475	10.1	5.3	8.3	3.7
Other countries	817	1,333	1,027	1,044	15.1	11.1	17.2	8.1
Total	5,384	12,026	5,998	12,904	100.0	100.0	100.0	100.0

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927–28 to 1930–31*—Continued

Article and country to which exported	Year beginning July: Quantity 1927–28	1928–29	1929–30	1930–31	Per cent of total 1927–28	1928–29	1929–30	1930–31
VEGETABLE PRODUCTS—continued								
Fruits—Continued.								
Fresh—Continued.	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*1,000 boxes*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Oranges—								
United Kingdom	402	709	796	669	13.5	16.8	21.7	16.8
Canada	2,346	3,151	2,568	2,873	78.5	74.6	69.9	72.1
Other countries	240	363	310	442	8.0	8.6	8.4	11.1
Total	2,988	4,223	3,674	3,984	100.0	100.0	100.0	100.0
Grapefruit—								
United Kingdom	333	561	496	741	46.3	59.7	58.1	60.6
Canada	349	335	308	408	48.5	35.6	36.1	33.4
Germany	6	8	10	23	.8	.9	1.2	1.9
France	4	4	5	7	.6	.4	.6	.6
Other countries	27	32	35	43	3.8	3.4	4.0	3.5
Total	719	940	854	1,222	100.0	100.0	100.0	100.0
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*				
Canned—								
United Kingdom	177,256	236,754	203,151	215,575	69.3	71.8	71.6	79.5
Other Europe	38,539	47,646	40,171	26,667	15.0	14.4	14.2	9.9
Total Europe	215,795	284,400	243,322	242,242	84.3	86.2	85.8	89.4
Canada	17,993	22,769	20,438	13,693	7.0	6.9	7.2	5.1
Other countries	22,088	22,654	19,957	15,161	8.7	6.9	7.0	5.5
Total	255,876	329,823	283,717	271,096	100.0	100.0	100.0	100.0
Grains and grain products:	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*				
Barley (grain)—								
Germany	11,599	13,085	1,521	0	31.7	23.0	7.1	0
United Kingdom	10,151	13,161	9,370	8,670	27.8	23.1	43.5	83.4
Netherlands	2,581	3,909	479	8	7.1	6.9	2.2	.1
Belgium	642	1,782	651	863	1.8	3.1	3.0	8.3
Other Europe	634	749	756	537	1.6	1.2	3.5	5.2
Total Europe	25,607	32,686	12,777	10,078	70.0	57.3	59.3	97.0
Canada	10,453	23,886	8,144	9	28.6	41.9	37.8	.1
Other countries	520	424	623	303	1.4	.8	2.9	2.9
Total	36,580	56,996	21,544	10,390	100.0	100.0	100.0	100.0
Corn (grain)—								
Netherlands	4,311	7,977	126	50	23.5	19.6	1.3	2.0
Germany	2,520	4,241	0	69	13.7	10.4	0	2.7
United Kingdom	1,885	8,237	20	8	10.3	20.2	.2	.3
Denmark	845	896	0	1	4.6	2.2	0	0
Canada	6,454	11,082	7,390	1,414	35.1	27.2	79.0	55.9
Cuba	1,021	765	226	18	5.6	1.9	2.4	.7
Mexico	323	572	1,297	823	1.8	1.4	13.9	32.5
Other countries	1,015	6,974	295	146	5.4	17.1	3.2	5.9
Total	18,374	40,744	9,354	2,529	100.0	100.0	100.0	100.0
Oats—								
United Kingdom	645	1,177	13	0	10.7	10.8	.3	0
Belgium	123	257	0	0	2.0	2.4	0.	0
Germany	115	0	0	0	1.9	0.	0	0
France	44	141	0	0	.7	1.3	0	0
Other Europe	316	1,620	2	0	5.3	15.0	0	0
Total Europe	1,243	3,195	15	0	20.6	29.5	.3	0
Canada	3,426	6,501	3,913	680	56.8	59.9	84.4	75.0
Cuba	1,028	861	490	61	17.0	7.9	10.6	6.7
Mexico	98	51	44	35	1.6	.5	.9	3.9
Other countries	239	240	173	131	4.0	2.2	3.8	14.4
Total	6,034	10,848	4,635	907	100.0	100.0	100.0	100.0

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927–28 to 1930–31*—Continued

Article and country to which exported	Year beginning July							
	Quantity				Per cent of total			
	1927–28	1928–29	1929–30	1930–31	1927–28	1928–29	1929–30	1930–31
VEGETABLE PRODUCTS—continued								
Grains and grain products—Contd.	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Oatmeal—								
United Kingdom	14,447	23,775	8,358	4,833	21.2	24.4	13.9	12.1
Finland	9,471	17,335	8,441	431	13.9	17.8	14.1	1.1
Netherlands	7,485	14,525	7,804	9,479	11.0	14.9	13.0	23.9
Belgium	2,890	3,064	801	1,955	4.2	3.2	1.3	4.9
Other Europe	5,456	9,249	2,637	1,160	8.0	9.6	4.5	2.8
Total Europe	39,749	67,948	28,041	17,858	58.3	69.9	46.8	44.8
South America	9,757	11,389	10,431	8,093	14.3	11.7	17.4	20.3
Mexico	3,739	3,802	4,054	3,202	5.5	3.9	6.8	8.0
Canada	3,582	1,556	5,402	1,046	5.3	1.6	9.0	2.6
British India	1,770	1,594	2,013	1,400	2.6	1.6	3.4	3.5
Other countries	9,595	10,956	10,012	8,287	14.0	11.3	16.6	20.8
Total	68,192	97,245	59,953	39,886	100.0	100.0	100.0	100.0
Rice (grain)—								
Germany	35,851	43,799	37,915	34,527	15.6	14.0	16.1	15.4
United Kingdom	35,459	41,812	35,854	32,364	15.4	13.3	15.2	14.4
Belgium	12,778	23,167	8,959	14,735	5.5	7.4	3.8	6.6
France	12,388	16,065	13,419	18,187	5.4	5.1	5.7	8.1
Other Europe	37,343	48,274	35,602	42,877	16.2	15.4	15.2	19.0
Total Europe	133,819	173,117	131,749	142,690	58.1	55.2	56.0	63.5
South America	41,205	78,719	69,297	54,899	17.9	25.1	29.5	24.4
Canada	14,227	19,800	18,239	17,342	6.2	6.3	7.8	7.7
Central America	5,888	5,852	5,031	4,607	2.6	1.9	2.1	2.1
Japan	2,020	14,609	935	378	.9	4.7	.4	.2
Other countries	33,273	21,308	9,908	4,633	14.3	6.8	4.2	2.1
Total	230,432	313,405	235,159	224,549	100.0	100.0	100.0	100.0
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*				
Rye—								
United Kingdom	1,710	1,174	21	0	6.6	12.6	.8	0
Netherlands	1,408	868	0	21	5.4	9.3	0	11.7
Germany	1,245	364	21	0	4.8	3.9	.8	0
Denmark	466	406	69	48	1.8	4.3	2.7	26.8
Norway	298	57	3	0	1.1	.6	.1	0
France	145	13	11	17	.6	.1	.4	9.5
Belgium	135	9	0	41	.5	.1	0	22.9
Italy	0	0	0	40	0	0	0	22.3
Other Europe	567	490	17	1	2.1	5.3	.8	.7
Total Europe	5,974	3,381	142	168	22.9	36.2	5.6	93.9
Canada	20,080	5,913	2,347	0	77.0	63.3	92.5	0
Other countries	10	52	49	11	.1	.5	1.9	6.1
Total	26,064	9,346	2,538	179	100.0	100.0	100.0	100.0
Wheat—								
United Kingdom	36,574	16,276	23,931	17,863	25.1	15.8	26.0	23.4
Netherlands	11,559	5,149	6,197	6,943	7.9	5.0	6.7	9.1
Italy	10,450	5,047	905	3,675	7.2	4.9	1.0	4.8
Belgium	8,797	3,232	6,314	7,306	6.0	3.1	6.9	9.6
Germany	5,582	1,674	4,769	1,722	3.8	1.6	5.2	2.3
France	5,127	2,215	2,214	7,859	3.5	2.1	2.4	10.3
Other Europe	11,114	13,052	12,349	6,516	7.6	12.7	13.3	8.5
Total Europe	89,203	46,645	56,679	51,884	61.1	45.2	61.5	68.0
Canada	45,563	41,190	16,777	12,493	31.2	39.9	18.2	16.4
Japan	6,304	3,782	9,185	3,063	4.3	3.7	10.0	4.0
China	0	1,241	140	1,872	0	1.2	0.2	2.5
Other countries	4,929	10,256	9,394	6,965	3.4	10.0	10.1	9.1
Total	145,999	103,114	92,175	76,277	100.0	100.0	100.0	100.0

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927–28 to 1930–31*—Continued

Article and country to which exported	Year beginning July							
	Quantity				Per cent of total			
	1927–28	1928–29	1929–30	1930–31	1927–28	1928–29	1929–30	1930–31
VEGETABLE PRODUCTS—continued								
Grains and grain products—Contd.	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Wheat, flour—								
Netherlands	1,530	1,084	1,031	1,330	11.9	8.4	7.9	11.3
United Kingdom	1,224	886	1,560	1,378	9.5	6.9	12.0	11.7
Germany	534	312	452	243	4.2	2.4	3.5	2.1
Greece	113	49	30	12	.9	.4	.2	.1
Other Europe	1,692	1,377	1,667	1,570	13.2	10.7	12.9	13.4
Total Europe	5,093	3,708	4,740	4,533	39.7	28.8	36.5	38.6
Cuba	1,216	1,204	1,199	968	9.5	9.3	9.2	8.2
Hong Kong	929	868	752	843	7.2	6.7	5.8	7.2
Brazil	873	831	780	671	6.8	6.4	6.0	5.7
China	790	1,242	553	1,000	6.2	9.6	4.3	8.5
Philippine Islands	727	802	730	640	5.7	6.2	5.6	5.4
Central America	697	752	684	658	5.4	5.8	5.3	5.6
Other West Indies [2]	676	809	663	589	5.3	6.3	5.1	5.0
Kwantung	136	428	891	382	1.1	3.3	6.9	3.2
Other countries	1,684	2,244	2,002	1,473	13.1	17.6	15.3	12.6
Total	12,821	12,888	12,994	11,757	100.0	100.0	100.0	100.0
	1,000 pounds	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*				
Hops—								
United Kingdom	6,121	4,175	3,255	2,745	51.8	47.2	47.9	49.1
Belgium	255	129	93	77	2.2	1.5	1.4	1.4
Other Europe	1,342	1,033	653	906	11.3	11.7	9.6	16.2
Total Europe	7,718	5,337	4,001	3,728	65.3	60.4	58.9	66.7
Canada	3,168	2,838	2,522	1,685	26.8	32.1	37.1	30.1
Other countries	926	661	270	180	7.9	7.5	4.0	3.2
Total	11,812	8,836	6,793	5,593	100.0	100.0	100.0	100.0
Oil cake and oil-cake meal—								
Cottonseed cake—								
Denmark	450,524	319,596	168,488	67,820	85.5	80.9	79.6	95.8
Germany	58,778	49,844	39,505	0	11.2	12.6	18.7	0
Other Europe	17,611	25,790	3,371	21	3.3	6.5	1.6	.1
Total Europe	526,913	395,230	211,364	67,841	100.0	100.0	99.9	95.9
Other countries	110	27	202	2,918	0	0	.1	4.1
Total	527,023	395,257	211,566	70,759	100.0	100.0	100.0	100.0
Cottonseed meal—								
United Kingdom	45,844	60,084	46,955	3,297	33.3	33.9	36.5	20.0
Germany	39,157	46,312	19,752	0	28.5	26.1	15.4	0
Norway	11,655	10,192	1,019	112	8.5	5.7	.8	.7
Other Europe	30,102	46,151	30,422	2,299	21.9	26.0	23.6	13.9
Total Europe	126,758	162,739	98,148	5,708	92.2	91.7	76.3	34.6
Canada	9,686	12,956	26,347	8,543	7.0	7.3	20.5	51.8
Other countries	1,054	1,720	4,112	2,247	.8	1.0	3.2	13.6
Total	137,498	177,415	128,607	16,498	100.0	100.0	100.0	100.0
Linseed or flaxseed cake—								
Netherlands	305,321	371,385	323,537	141,505	51.8	59.4	53.8	48.8
Belgium	235,883	204,205	184,988	89,849	40.0	32.7	30.7	31.0
United Kingdom	38,698	40,392	48,745	42,495	6.6	6.5	8.1	14.7
Other Europe	9,151	8,104	42,116	15,306	1.6	1.3	7.0	5.3
Total Europe	589,053	624,086	599,386	289,155	100.0	99.9	99.6	99.8
Other countries	121	827	2,433	591	0	.1	.4	.2
Total	589,174	624,913	601,819	289,746	100.0	100.0	100.0	100.0

[2] Excludes Bermuda.

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927–28 to 1930–31*—Continued

Article and country to which exported	Year beginning July							
	Quantity				Per cent of total			
	1927–28	1928–29	1929–30	1930–31	1927–28	1928–29	1929–30	1930–31
VEGETABLE PRODUCTS—continued								
Oils, vegetable:	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Cottonseed—								
Canada	49, 407	20, 550	24, 666	9, 152	80. 4	69. 6	77. 1	34. 7
Mexico	5, 318	2, 374	947	3, 954	8. 7	8. 0	3. 0	15. 0
Cuba	2, 033	1, 836	2, 448	9, 855	3. 3	6. 2	7. 7	37. 4
Argentina	1, 108	912	253	94	1. 8	3. 1	. 8	. 4
Japan	831	911	1, 179	1, 146	1. 4	3. 1	3. 7	4. 3
Panama	719	788	1, 063	768	1. 2	2. 7	3. 3	2. 9
Other countries	2, 054	2, 160	1, 442	1, 384	3. 2	7. 3	4. 4	5. 3
Total	61, 470	29, 531	31, 998	26, 353	100. 0	100. 0	100. 0	100. 0
Sugar, refined:	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*				
United Kingdom	35	24	25	23	33. 0	18. 8	31. 6	32. 9
Norway	13	14	6	2	12. 3	10. 9	7. 6	2. 9
France	1	2	1	2	. 9	1. 6	1. 3	2. 9
Other Europe	12	6	8	7	11. 3	4. 6	10. 1	9. 9
Total Europe	61	46	40	34	57. 5	35. 9	50. 6	48. 6
Uruguay	13	26	6	7	12. 3	20. 3	7. 6	10. 0
West Indies and Bermudas	5	6	5	5	4. 7	4. 7	6. 3	7. 1
British Africa	5	12	6	5	4. 7	9. 4	7. 6	7. 1
Canada	4	7	3	2	3. 8	5. 5	3. 8	2. 9
Mexico	2	5	4	1	1. 9	3. 9	5. 1	1. 4
Panama	2	2	3	4	1. 9	1. 6	3. 8	5. 7
Other countries	14	24	12	12	13. 2	18. 7	15. 2	17. 2
Total	106	128	79	70	100. 0	100. 0	100. 0	100. 0
Tobacco, leaf:	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*				
Bright flue cured—								
United Kingdom	157, 506	171, 515	186, 583	184, 448	47. 9	41. 4	43. 4	42. 6
Germany	13, 378	13, 841	8, 150	12, 274	4. 1	3. 3	1. 9	2. 8
Other Europe	21, 197	25, 197	39, 932	28, 172	6. 4	6. 2	9. 3	6. 6
Total Europe	192, 081	210, 553	234, 665	224, 894	58. 4	50. 9	54. 6	52. 0
China [4]	68, 842	131, 254	128, 144	143, 989	20. 9	31. 7	29. 8	33. 3
Australia	21, 488	18, 146	19, 492	23, 173	6. 5	4. 4	4. 5	5. 4
Canada	14, 049	14, 601	13, 660	11, 210	4. 3	3. 5	3. 2	2. 6
Japan	11, 555	14, 564	10, 395	11, 604	3. 5	3. 5	2. 4	2. 7
British India	5, 031	5, 884	3, 874	1, 162	1. 5	1. 4	. 9	. 3
Other countries	15, 878	18, 947	19, 712	16, 656	4. 9	4. 6	4. 6	3. 7
Total	328, 924	413, 949	429, 942	432, 688	100. 0	100. 0	100. 0	100. 0

Bureau of Agricultural Economics. Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1928–1931, and official records of the Bureau of Foreign and Domestic Commerce.

[4] Includes Hong Kong and Kwantung.

TABLE 444.—*Principal agricultural products imported into the United States, by countries, 1927–28 to 1930–31*

Article and country from which imported	Year beginning July							
	Quantity				Per cent of total			
	1927–28	1928–29	1929–30	1930–31 [1]	1927–28	1928–29	1929–30	1930–31 [1]
ANIMALS AND ANIMAL PRODUCTS								
Cattle:	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Canada	343	256	192	26	62.6	45.2	45.8	31.3
Mexico	204	309	226	56	37.2	54.6	53.9	67.5
Other countries	1	1	1	1	.2	.2	.3	1.2
Total	548	566	419	83	100.0	100.0	100.0	100.0
Butter:	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*				
United Kingdom	870	58	171	17	17.6	1.8	6.0	1.3
Denmark	761	902	1,109	172	15.4	27.3	38.9	12.9
Other Europe	453	279	38	26	9.1	8.5	1.3	2.0
Total Europe	2,084	1,239	1,318	215	42.1	37.6	46.2	16.2
New Zealand	2,396	1,674	1,141	877	48.4	50.7	40.0	66.0
Canada	275	237	142	162	5.5	7.2	5.0	12.2
Other countries	200	149	250	75	4.0	4.5	8.8	5.6
Total	4,955	3,299	2,851	1,329	100.0	100.0	100.0	100.0
Cheese:								
Italy	31,332	38,337	36,989	29,430	41.5	45.3	47.3	50.8
Switzerland	16,449	19,731	19,386	15,178	21.8	23.3	24.8	26.2
France	5,874	6,243	6,058	4,279	7.8	7.4	7.7	7.4
Netherlands	3,736	3,525	2,917	2,372	5.0	4.2	3.7	4.1
Other Europe	5,983	6,052	6,509	5,716	7.9	7.1	8.3	9.8
Total Europe	63,374	73,888	71,859	56,975	84.0	87.3	91.8	98.3
Canada	11,439	9,381	5,895	817	15.2	11.1	7.5	1.4
Other countries	611	1,337	506	180	.8	1.6	.7	.3
Total	75,424	84,606	78,261	57,972	100.0	100.0	100.0	100.0
Eggs, in the shell:	*1,000 dozen*	*1,000 dozen*	*1,000 dozen*	*1,000 dozen*				
Hong Kong	199	236	250	263	77.7	81.1	74.2	87.4
China	40	28	15	19	15.6	9.6	4.5	6.3
Canada	13	13	60	15	5.1	4.5	17.8	5.0
Other countries	4	14	12	4	1.6	4.8	3.5	1.3
Total	256	291	337	301	100.0	100.0	100.0	100.0
Eggs and egg yolks (dried, frozen, and preserved):	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*				
China	5,409	20,582	18,206	7,918	91.7	84.1	79.3	98.3
United Kingdom	248	3,285	4,498	76	4.2	13.4	19.6	.9
Other countries	244	593	253	62	4.1	2.5	1.1	.8
Total	5,901	24,460	22,957	8,056	100.0	100.0	100.0	100.0
Egg albumen:								
China	2,836	3,431	4,868	2,208	97.3	97.8	91.5	99.4
Other countries	78	77	450	13	2.7	2.2	8.5	.6
Total	2,914	3,508	5,318	2,221	100.0	100.0	100.0	100.0
Fibers, animal:								
Silk, raw, in skeins reeled from cocoon—								
Japan	64,673	63,415	61,243	67,309	85.4	82.1	78.8	82.3
China	9,816	12,326	12,717	10,432	13.0	16.0	16.4	12.8
Other countries	1,269	1,455	3,733	4,038	1.6	1.9	4.8	4.9
Total	75,758	77,196	77,693	81,779	100.0	100.0	100.0	100.0
Wool, unmanufactured—								
Carpet wool—								
United Kingdom	32,423	33,861	23,326	14,085	22.3	20.6	16.5	13.6
France	5,414	4,470	4,260	1,814	3.7	2.7	3.0	1.8
China	55,998	53,589	36,931	33,603	38.5	32.5	26.2	32.5
British India	10,811	14,390	11,106	5,163	7.4	8.7	7.9	5.0
Argentine	8,924	19,820	24,405	25,567	6.1	12.0	17.3	24.8
Palestine and Syria	8,420	3,953	10,460	4,388	5.8	2.4	7.4	4.2
Other countries	23,499	34,630	30,623	18,641	16.2	21.1	21.7	18.1
Total	145,489	164,713	141,111	103,261	100.0	100.0	100.0	100.0

[1] Preliminary.

TABLE 444.—*Principal agricultural products imported into the United States, by countries, 1927–28 to 1930–31*—Continued

Article and country from which imported	Year beginning July							
	Quantity				Per cent of total			
	1927–28	1928–29	1929–30	1930–31	1927–28	1928–29	1929–30	1930–31
ANIMALS AND ANIMAL PRODUCTS—continued								
Fibers, animal—Continued.								
Wool, unmanufactured—Con.	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Clothing wool—								
United Kingdom	4,169	2,499	1,807	1,800	21.5	13.6	9.6	27.4
Australia	5,515	5,936	5,690	2,871	28.5	32.2	30.2	43.8
Canada	2,838	1,601	1,129	312	14.6	8.7	6.0	4.8
Argentina	2,545	1,872	2,300	354	13.1	10.2	12.2	5.4
Chile	1,677	1,625	1,094	361	8.7	8.8	5.8	5.5
New Zealand	1,670	2,081	3,514	366	8.6	11.3	18.6	5.6
Uruguay	213	1,062	1,275	143	1.1	5.8	6.8	2.2
Other countries	747	1,732	2,047	351	3.9	9.4	10.8	5.3
Total	19,374	18,408	18,856	6,558	100.0	100.0	100.0	100.0
Combing wool—								
United Kingdom	17,344	12,319	8,784	2,933	21.6	14.8	15.0	7.6
Australia	21,992	17,906	14,911	22,018	27.4	21.4	25.5	56.9
Argentina	11,424	12,875	10,674	1,898	14.2	15.4	18.3	4.9
New Zealand	8,260	8,577	3,093	2,065	10.3	10.3	5.3	5.3
Uruguay	6,962	20,341	11,815	4,553	8.7	24.4	20.2	11.8
Other countries	14,300	11,460	9,197	5,261	17.8	13.7	15.7	13.5
Total	80,282	83,478	58,474	38,728	100.0	100.0	100.0	100.0
Hair of the Angora goat (mohair), alpaca, etc.—								
United Kingdom	541	384	391	350	18.7	8.9	19.2	35.0
Turkey (Europe and Asia)	983	2,034	553	9	34.0	46.9	27.2	.9
British South Africa	660	884	370	407	22.8	20.4	18.2	40.7
Peru	425	716	622	149	14.7	16.5	30.6	14.9
China	184	145	48	26	6.4	3.3	2.4	2.6
Other countries	97	175	52	58	3.4	4.0	2.4	5.9
Total	2,890	4,338	2,036	999	100.0	100.0	100.0	100.0
Sausage casings:								
Germany	1,353	2,599	1,813	763	6.9	11.8	8.4	5.7
Argentina	4,975	5,719	5,459	3,897	25.5	26.0	25.3	29.2
Canada	3,928	2,989	2,218	1,808	20.1	13.6	10.3	13.5
Australia	2,213	2,597	3,024	1,638	11.3	11.8	14.0	12.3
China	1,640	1,445	1,256	918	8.4	6.6	5.8	6.9
New Zealand	1,223	1,086	1,470	798	6.3	4.9	6.8	6.0
Uruguay	917	1,317	1,527	736	4.7	6.0	7.1	5.5
Other countries	3,296	4,288	4,789	2,797	16.8	19.3	22.3	20.9
Total	19,545	22,040	21,556	13,355	100.0	100.0	100.0	100.0
VEGETABLE PRODUCTS								
Cocoa or cacao beans:								
Germany	29,074	17,424	8,565	11,506	7.1	4.2	2.0	2.8
British West Africa	133,963	146,739	145,400	151,524	32.6	35.0	34.5	36.5
Brazil	100,262	87,338	95,516	75,726	24.4	20.8	22.6	18.2
Dominican Republic	39,591	50,353	41,120	37,898	9.6	12.0	9.7	9.1
British West Indies and Bermudas	38,217	41,933	39,276	41,805	9.3	10.0	9.3	10.1
Ecuador	19,210	16,939	14,754	13,170	4.7	4.0	3.5	3.2
Venezuela	14,482	18,008	19,302	17,338	3.5	4.3	4.6	4.2
Other countries	36,744	40,509	58,005	66,475	8.8	9.7	13.8	15.9
Total	411,543	419,243	421,938	415,442	100.0	100.0	100.0	100.0
Coffee:								
Brazil	1,059,742	933,056	1,011,430	1,196,881	69.0	65.0	64.7	69.2
Colombia	261,678	263,236	351,333	330,379	17.0	18.3	22.5	19.1
Central America	64,443	54,774	56,763	53,276	4.2	3.8	3.6	3.1
Other countries	149,529	184,004	142,532	148,033	9.8	12.9	9.2	8.6
Total	1,535,392	1,435,070	1,562,058	1,728,569	100.0	100.0	100.0	100.0

TABLE 444.—*Principal agricultural products imported into the United States, by countries, 1927–28 to 1930–31*—Continued

Article and country from which imported	Year beginning July: Quantity				Per cent of total			
	1927–28	1928–29	1929–30	1930–31	1927–28	1928–29	1929–30	1930–31
VEGETABLE PRODUCTS—contd.								
Fibers, vegetable:	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Cotton, raw—								
Egypt	94, 581	135, 007	86, 872	10, 183	53. 9	59. 4	44. 0	19. 9
China	32, 123	18, 554	22, 086	14, 883	18. 3	8. 2	11. 2	29. 1
British India	12, 467	25, 736	28, 297	16, 528	7. 1	11. 3	14. 3	32. 3
Mexico	11, 508	26, 004	19, 456	6, 806	6. 6	11. 4	9. 9	13. 3
Peru	9, 146	8, 636	9, 151	959	5. 2	3. 8	4. 6	1. 9
Other countries	15, 625	13, 517	31, 795	1, 833	8. 9	5. 9	16. 0	3. 5
Total	175, 450	227, 454	197, 657	51, 192	100. 0	100. 0	100. 0	100. 0
Flax, unmanufactured-	*Long tons*	*Long tons*	*Long tons*	*Long tons*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
United Kingdom	1, 800	1, 758	1, 768	383	33. 1	31. 1	25. 2	10. 6
Latvia	1, 520	2, 176	2, 231	1, 926	28. 0	38. 5	31. 8	53. 5
Belgium	739	757	810	536	13. 6	13. 4	11. 5	14. 9
Netherlands	253	208	231	154	4. 7	3. 7	3. 3	4. 3
Russia in Europe	149	294	1, 127	155	2. 7	5. 2	16. 1	4. 3
Estonia	113	0	31	0	2. 1	0	. 4	0
Other Europe	613	283	664	275	11. 2	5. 0	9. 5	7. 7
Total Europe	5, 187	5, 476	6, 862	3, 429	95. 4	96. 9	97. 8	95. 3
Canada	126	72	97	137	2. 3	1. 3	1. 4	3. 8
Other countries	124	102	54	32	2. 3	1. 8	. 8	. 9
Total	5, 437	5, 650	7, 013	3, 598	100. 0	100. 0	100. 0	100. 0
Manila fiber—	*1,000 long tons*	*1,000 long tons*	*1,000 long tons*	*1,000 long tons*				
Philippine Islands	47	60	71	42	97. 9	100. 0	97. 3	97. 7
Other countries	1	0	2	1	2. 1	0	2. 7	2. 3
Total	48	60	73	43	100. 0	100. 0	100. 0	100. 0
Sisal and henequen—								
Mexico	93	95	57	38	75. 0	70. 4	50. 9	45. 2
Dutch East Indies	16	20	30	25	12. 9	14. 8	26. 8	29. 8
United Kingdom	0	2	2	7	0	1. 5	1. 8	8. 3
Cuba	2	2	3	4	1. 6	1. 5	2. 7	4. 8
Other countries	13	16	20	10	10. 5	11. 8	17. 8	11. 9
Total	124	135	113	84	100. 0	100. 0	100. 0	100. 0
Fruits:								
Dried—	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*				
Currants—								
Greece	10, 800	9, 178	9, 950	8, 594	97. 9	97. 8	99. 0	99. 8
Other Europe	56	108	13	0	. 5	1. 2	. 1	0
Total Europe	10, 856	9, 286	9, 963	8, 594	98. 4	99. 0	99. 1	99. 8
Other countries	178	96	92	16	1. 6	1. 0	. 9	. 2
Total	11, 034	9, 382	10, 055	8, 610	100. 0	100. 0	100. 0	100. 0
Dates—								
United Kingdom	6, 987	3, 085	1, 350	5, 544	15. 8	5. 7	2. 5	13. 1
Iraq	34, 700	45, 373	48, 804	34, 418	78. 6	83. 9	91. 7	81. 1
Hejaz, Arabia, etc	694	476	703	990	1. 6	. 9	1. 3	2. 3
Other countries	1, 747	5, 153	2, 392	1, 476	4. 0	9. 5	4. 5	3. 5
Total	44, 128	54, 087	53, 250	42, 428	100. 0	100. 0	100. 0	100. 0
Figs—								
Turkey (Europe and Asia)	16, 566	22, 418	12, 784	9, 998	52. 7	63. 0	58. 3	67. 4
Portugal	5, 933	4, 404	934	843	18. 9	12. 4	4. 3	5. 7
Greece	2, 465	4, 910	6, 084	2, 933	7. 8	13. 8	27. 8	19. 8
Italy	1, 943	1, 358	641	1, 018	6. 2	3. 8	2. 9	6. 9
Other countries	4, 552	2, 473	1, 474	33	14. 4	7. 0	6. 7	. 2
Total	31, 459	35, 563	21, 917	14, 825	100. 0	100. 0	100. 0	100. 0

TABLE 444.—*Principal agricultural products imported into the United States, by countries, 1927–28 to 1930–31*—Continued

Article and country from which imported	Year beginning July: Quantity 1927–28	1928–29	1929–30	1930–31	Per cent of total 1927–28	1928–29	1929–30	1930–31
VEGETABLE PRODUCTS—contd.								
Fruits—Continued.								
Fresh—	*1,000 bunches*	*1,000 bunches*	*1,000 bunches*	*1,000 bunches*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Bananas—								
Central America	39, 676	42, 386	42, 764	36, 818	62. 0	66. 7	64. 9	63. 7
Jamaica	13, 398	11, 722	11, 513	11, 010	20. 9	18. 4	17. 5	19. 0
Cuba	2, 730	3, 467	4, 149	3, 562	4. 3	5. 5	6. 3	6. 2
Colombia	1, 695	1, 439	1, 171	909	2. 6	2. 3	1. 8	1. 6
Other countries	6, 530	4, 516	6, 312	5, 542	10. 2	7. 1	9. 5	9. 5
Total	64, 029	63, 530	65, 909	57, 841	100. 0	100. 0	100. 0	100. 0
	1,000 boxes [2]	*1,000 boxes* [2]	*1,000 boxes* [2]	*1,000 boxes* [2]	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Lemons—								
Italy	1, 300	282	1, 217	342	99. 4	97. 7	99. 0	97. 7
Other Europe	4	8	10	8	. 3	2. 0	. 9	2. 3
Total Europe	1, 304	390	1, 227	350	99. 7	99. 7	99. 9	100. 0
Other countries	4	1	2	0	. 3	. 3	. 1	0
Total	1, 308	391	1, 229	350	100. 0	100. 0	100. 0	100. 0
	1,000 gallons	*1,000 gallons*	*1,000 gallons*	*1,000 gallons*				
Olives—								
Spain	5, 739	6, 209	7, 746	6, 649	88. 9	89. 3	91. 6	89. 5
Greece	144	204	308	625	2. 2	2. 9	3. 6	8. 4
Other Europe	532	496	357	144	8. 2	7. 1	4. 3	2. 0
Total Europe	6, 415	6, 909	8, 411	7, 418	99. 3	99. 3	99. 5	99. 9
Other countries	43	46	41	11	. 7	. 7	. 5	. 1
Total	6, 458	6, 955	8, 452	7, 429	100. 0	100. 0	100. 0	100. 0
Grains, flours, etc.:	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*				
Rice, cleaned (except patna)—								
Italy	3, 971	1, 032	1, 310	1, 391	11. 8	4. 1	6. 3	5. 2
Netherlands	2, 139	271	1, 622	2, 419	6. 4	1. 1	7. 7	9. 1
Germany	1, 077	396	489	2, 367	3. 2	1. 6	2. 3	8. 9
Hong Kong	20, 786	17, 934	15, 094	15, 878	61. 7	71. 3	72. 1	59. 6
Mexico	1, 264	1, 022	1, 259	2, 700	3. 8	4. 1	6. 0	10. 1
British India	1, 061	2, 380	243	1, 059	3. 2	9. 5	1. 2	4. 0
Other countries	3, 376	2, 131	929	812	9. 9	8. 3	4. 4	3. 1
Total	33, 674	25, 166	20, 946	26, 626	100. 0	100. 0	100. 0	100. 0
Rice, patna—								
Netherlands	1, 826	2, 329	2, 010	2, 051	100. 0	100. 0	92. 4	96. 9
Other countries	0	0	166	65	0	0	7. 6	3. 1
Total	1, 826	2, 329	2, 176	2, 116	100. 0	100. 0	100. 0	100. 0
Rice, uncleaned—								
Mexico	3, 036	5, 904	4, 181	0	50. 6	73. 3	59. 7	0
Japan	2, 316	1, 441	1, 492	5, 011	38. 6	17. 9	21. 3	81. 3
British India	428	325	694	419	7. 1	4. 0	9. 9	6. 8
Other countries	216	390	638	732	3. 7	4. 8	9. 1	11. 9
Total	5, 996	8, 060	7, 005	6, 162	100. 0	100. 0	100. 0	100. 0
Rice, flour, and meal—								
Netherlands	21	0	100	0	. 8	0	9. 2	0
Mexico	1, 981	508	340	0	76. 0	41. 0	31. 3	0
Japan	442	504	472	426	17. 0	40. 7	43. 5	70. 6
China	38	68	51	24	1. 5	5. 5	4. 7	4. 0
Other countries	124	159	122	153	4. 7	12. 8	11. 3	25. 4
Total	2, 606	1, 239	1, 085	603	100. 0	100. 0	100. 0	100. 0
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*				
Wheat—								
Canada	15, 706	21, 429	12, 948	19, 053	100. 0	100. 0	100. 0	100. 0
Other countries	0	1	0	1	0	0	0	0
Total	15, 706	21, 430	12, 948	19, 054	100. 0	100. 0	100. 0	100. 0

[2] Boxes of 74 pounds net.

TABLE 444.—*Principal agricultural products imported into the United States, by countries, 1927–28 to 1930–31*—Continued

Article and country from which imported	Year beginning July: Quantity 1927–28	Quantity 1928–29	Quantity 1929–30	Quantity 1930–31	Per cent of total 1927–28	Per cent of total 1928–29	Per cent of total 1929–30	Per cent of total 1930–31
VEGETABLE PRODUCTS—contd.								
Grains, flours, etc.—Continued.	*1,000 barrels*	*1,000 barrels*	*1,000 barrels*	*1,000 barrels*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Wheat flour—								
Canada	3	2	1	1	50.0	66.7	50.0	100.0
Ecuador	2	0	0	0	33.3	0	0	0
United Kingdom	0	0	1	0	0	0	50.0	0
Other countries	1	1	0	0	16.7	33.3	0	0
Total	6	3	2	1	100.0	100.0	100.0	100.0
Nuts:	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Almonds, shelled—								
Spain	9,637	10,399	8,902	6,432	52.8	57.4	48.6	48.6
Italy	7,703	6,578	8,912	6,348	42.2	36.3	48.7	47.9
France	306	286	136	223	1.7	1.6	.7	1.7
Other Europe	197	273	118	61	1.0	1.6	.7	.5
Total Europe	17,843	17,536	18,068	13,064	97.7	96.9	98.7	98.7
Other countries	414	570	236	177	2.3	3.1	1.3	1.3
Total	18,257	18,106	18,304	13,241	100.0	100.0	100.0	100.0
Almonds, not shelled—								
Spain	229	1,068	4,530	3	49.4	56.5	82.3	3.9
France	131	474	518	54	28.2	25.1	9.4	69.2
Italy	98	73	375	18	21.1	3.9	6.8	23.1
Other Europe	5	267	61	0	1.1	14.0	1.2	0
Total Europe	463	1,882	5,484	75	99.8	99.5	99.7	96.2
Other countries	1	9	19	3	.2	.5	.3	3.8
Total	464	1,891	5,503	78	100.0	100.0	100.0	100.0
Filberts, shelled—								
Turkey in Europe	2,559	(3)	(3)	(3)	38.8	(3)	(3)	(3)
France	1,206	1,027	178	334	18.3	18.3	4.0	7.3
Spain	329	1,764	2,888	37	5.0	31.5	64.1	.8
Other Europe	447	984	826	797	6.7	17.5	18.3	17.3
Total Europe	4,541	3,775	3,892	1,168	68.8	67.3	86.4	25.4
Turkey in Asia	2,059	[4] 1,800	[4] 609	[4] 3,417	31.2	[4] 32.1	[4] 13.5	[4] 74.3
Other countries	0	31	2	11	0	.6	.1	.3
Total	6,600	5,606	4,503	4,596	100.0	100.0	100.0	100.0
Filberts, not shelled—								
Italy	6,687	11,053	4,548	3,987	59.5	91.1	79.2	70.5
Spain	1,936	818	954	423	17.2	6.7	16.6	7.5
Turkey in Europe	1,211	(3)	(3)	(3)	10.8	(3)	(3)	(3)
Other Europe	1,269	243	254	229	11.2	2.0	4.2	4.0
Total Europe	11,103	12,114	5,756	4,639	98.7	99.8	100.0	82.0
Turkey in Asia	54	[4] 20	[4] 0	[4] 820	.5	[4] .2	[4] 0	[4] 14.5
Other countries	87	0	0	200	.8	0	0	3.5
Total	11,244	12,134	5,756	5,659	100.0	100.0	100.0	100.0
Peanuts, shelled—								
China	49,986	23,987	7,140	4,989	91.2	90.2	89.2	91.9
Other countries	4,798	2,619	861	441	8.8	9.8	10.8	8.1
Total	54,784	26,606	8,001	5,430	100.0	100.0	100.0	100.0
Peanuts, not shelled—								
China	12,339	4,680	2,445	3,483	91.4	82.0	75.0	65.0
Japan, incl. Chosen	509	360	212	343	3.8	6.3	6.5	6.4
Philippine Islands	0	0	351	1,075	0	0	10.8	20.1
Other countries	650	669	253	457	4.8	11.7	7.7	8.5
Total	13,498	5,709	3,261	5,358	100.0	100.0	100.0	100.0

[3] Included with "Turkey in Asia." [4] Includes "Turkey in Europe."

TABLE 444.—*Principal agricultural products imported into the United States, by countries, 1927–28 to 1930–31*—Continued

Article and country from which imported	Year beginning July: Quantity 1927–28	1928–29	1929–30	1930–31	Per cent of total 1927–28	1928–29	1929–30	1930–31
VEGETABLE PRODUCTS—contd.								
Nuts—Continued.	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Walnuts, shelled—								
France	12,551	9,308	11,357	4,679	78.4	51.8	65.7	28.7
Other Europe	989	2,033	722	2,090	6.1	11.4	4.2	12.8
Total Europe	13,540	11,341	12,079	6,769	84.5	63.2	69.9	41.5
China	1,952	5,052	4,364	8,216	12.2	28.1	25.3	50.3
Other countries	523	1,563	835	1,341	3.3	8.7	4.8	8.2
Total	16,015	17,956	17,278	16,326	100.0	100.0	100.0	100.0
Walnuts, not shelled—								
Italy	4,558	4,501	4,620	2,356	44.2	28.9	65.8	66.3
France	2,244	2,720	831	477	21.8	17.5	11.8	13.4
Other Europe	144	3,336	117	99	1.3	21.4	1.7	2.8
Total Europe	6,946	10,557	5,568	2,932	67.3	67.8	79.3	82.5
China	2,531	4,575	1,419	504	24.5	29.4	20.2	14.2
Other countries	837	449	37	116	8.2	2.8	.5	3.3
Total	10,314	15,581	7,024	3,552	100.0	100.0	100.0	100.0
Oils, vegetable:								
Coconut oil, product of Philippine Islands	273,309	377,288	370,600	315,942	100.0	100.0	100.0	100.0
Olive oil, edible—								
Italy	45,145	62,202	71,265	45,661	64.4	70.6	72.4	61.9
Spain	17,797	16,910	20,909	23,675	25.4	19.2	21.2	32.1
France	5,335	6,182	2,959	2,335	7.6	7.0	3.0	3.2
Other Europe	954	1,527	710	542	1.3	1.7	.8	.7
Total Europe	69,231	86,821	95,843	72,213	98.7	98.5	97.4	97.9
Other countries	899	1,297	2,603	1,581	1.3	1.5	2.6	2.1
Total	70,130	88,118	98,446	73,794	100.0	100.0	100.0	100.0
Soybean oil—								
Kwantung	13,546	11,089	12,867	5,769	93.0	64.6	96.5	97.5
China	891	1,520	0	0	6.1	8.9	0	0
Japan	41	1,729	121	1	.3	10.1	.9	0
Other countries	84	2,834	345	145	.6	16.4	2.6	2.5
Total	14,562	17,172	13,332	5,915	100.0	100.0	100.0	100.0
Oilseeds:								
Copra, not prepared—								
Philippine Islands	336,920	386,567	299,193	311,781	73.9	61.4	60.6	55.1
British Malaya	40,381	84,700	42,114	57,619	8.9	13.4	8.5	10.2
French Oceania	25,273	21,306	22,662	21,482	5.5	3.4	4.6	3.8
British Oceania	19,941	37,685	43,778	48,774	4.4	6.0	8.9	8.6
Australia	17,445	55,988	35,455	30,077	3.8	8.9	7.2	5.3
Other countries	16,198	43,691	50,254	95,664	3.5	6.9	10.2	17.0
Total	456,158	629,937	493,456	565,397	100.0	100.0	100.0	100.0
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*				
Flaxseed—								
Argentina	16,057	20,927	19,236	6,102	88.7	89.1	97.9	78.1
Canada	1,933	2,528	355	1,490	10.7	10.8	1.8	19.1
Other countries	122	39	61	221	.6	.1	.3	2.8
Total	18,112	23,494	19,652	7,813	100.0	100.0	100.0	100.0
Seeds, except oilseeds:								
Clover seed—	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*				
Clover, red—								
Poland and Danzig	2,015	1,278	1,141	0	37.1	16.9	48.4	0
Russia in Europe	1,328	202	88	0	24.4	2.7	3.7	0
Germany	697	679	283	0	12.8	9.0	12.0	0
France	493	3,664	845	2,249	9.1	48.5	35.9	100.0
Other Europe	855	1,578	0	0	15.8	20.9	0	0
Total Europe	5,388	7,401	2,357	2,249	99.2	98.0	100.0	100.0
Other countries	46	151	0	0	.8	2.0	0	0
Total	5,434	7,552	2,357	2,249	100.0	100.0	100.0	100.0

TABLE 444.—*Principal agricultural products imported into the United States, by countries, 1927–28 to 1930–31*—Continued

Article and country from which imported	Year beginning July							
	Quantity				Per cent of total			
	1927–28	1928–29	1929–30	1930–31	1927–28	1928–29	1929–30	1930–31
VEGETABLE PRODUCTS—contd.								
Seeds, except oilseeds—Contd.								
Clover seed—Continued.								
All other, including alsike, crimson, and all other clover—	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Poland and Danzig	964	957	963	330	5. 9	6. 4	7. 4	7. 8
Germany	799	1, 651	2, 149	686	4. 9	11. 0	16. 5	16. 3
France	791	2, 750	589	1, 450	4. 8	18. 4	4. 5	34. 5
Hungary	485	372	1, 546	1, 510	3. 0	2. 5	11. 8	35. 9
Other Europe	221	303	286	129	1. 3	2. 1	2. 2	3. 1
Total Europe	3, 260	6, 033	5, 533	4, 105	19. 9	40. 4	42. 4	97. 6
Canada	13, 121	8, 899	7, 515	95	80. 0	59. 5	57. 6	2. 3
Other countries	16	12	0	8	. 1	. 1	0	. 1
Total	16, 397	14, 944	13, 048	4, 208	100. 0	100. 0	100. 0	100. 0
Spices:								
Pepper, unground—								
United Kingdom	5, 292	3, 435	3, 238	1, 499	22. 1	13. 4	10. 4	4. 8
British India	7, 907	6, 218	7, 505	6, 995	32. 9	24. 2	24. 2	22. 3
Dutch East Indies	6, 446	9, 205	17, 250	19, 351	26. 9	35. 9	55. 7	61. 8
British Malaya	2, 831	1, 469	870	1, 409	11. 8	5. 7	2. 8	4. 5
Other countries	1, 502	5, 336	2, 125	2, 045	6. 3	20. 8	6. 9	6. 6
Total	23, 978	25, 663	30, 988	31, 299	100. 0	100. 0	100. 0	100. 0
Sugar, raw, cane:	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*				
Cuba	3, 399	4, 109	2, 769	3, 010	84. 0	86. 5	76. 1	91. 5
Philippine Islands	613	605	809	254	15. 2	12. 7	22. 2	7. 7
Other countries	33	38	63	24	. 8	. 8	1. 7	. 8
Total	4, 045	4, 752	3, 641	3, 288	100. 0	100. 0	100. 0	100. 0
Tea:	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*				
United Kingdom	20, 380	23, 608	21, 578	23, 310	22. 6	25. 5	25. 0	26. 7
Japan	25, 399	27, 329	22, 048	21, 416	28. 2	29. 5	25. 5	24. 6
Ceylon	16, 326	16, 893	19, 047	16, 895	18. 1	18. 2	22. 1	19. 4
China	10, 131	8, 878	7, 405	6, 704	11. 1	9. 6	8. 6	7. 7
British India	9, 198	7, 688	9, 217	10, 612	10. 2	8. 3	10. 7	12. 2
Dutch East Indies	5, 398	5, 358	4, 891	5, 184	6. 0	5. 8	5. 7	5. 9
Other countries	3, 267	2, 881	2, 182	3, 027	3. 8	3. 1	2. 4	3. 5
Total	90, 099	92, 635	86, 368	87, 148	100. 0	100. 0	100. 0	100. 0
Tobacco, leaf, unmanufactured:								
Leaf, product of Philippine Islands	2, 541	4, 678	4, 007	4, 278	100. 0	100. 0	100. 0	100. 0
Leaf, for cigar wrappers—								
Netherlands	6, 218	6, 095	8, 415	2, 988	98. 0	98. 1	98. 5	98. 3
Other countries	126	117	126	51	2. 0	1. 9	1. 5	1. 7
Total	6, 344	6, 212	8, 541	3, 039	100. 0	100. 0	100. 0	100. 0
All other leaf—								
Greece	15, 694	16, 741	13, 400	18, 913	22. 3	25. 4	27. 7	30. 2
Italy	13, 743	11, 286	6, 563	12, 124	19. 6	17. 1	13. 6	19. 3
Germany	1, 242	305	391	71	1. 8	. 5	. 8	. 1
Cuba	21, 530	22, 116	21, 773	18, 299	30. 7	33. 5	45. 0	29. 2
Turkey (Europe and Asia)	17, 289	14, 269	6, 162	12, 974	24. 6	21. 6	12. 7	20. 7
Other countries	729	1, 284	87	284	1. 0	1. 9	. 2	. 5
Total	70, 227	66, 001	48, 376	62, 665	100. 0	100. 0	100. 0	100. 0
India rubber, crude:								
United Kingdom	110, 575	50, 938	7, 249	27, 970	11. 9	4. 2	. 6	2. 7
British Malaya	524, 834	811, 843	788, 594	733, 419	56. 7	66. 2	69. 3	71. 1
Dutch East Indies	170, 161	215, 863	195, 297	164, 690	18. 4	17. 6	17. 2	16. 0
Ceylon	73, 542	112, 257	118, 425	86, 985	7. 9	9. 1	10. 4	8. 4
Other countries	46, 928	36, 028	27, 841	19, 134	5. 1	2. 9	2. 5	1. 8
Total	926, 040	1, 226, 929	1, 137, 406	1, 032, 198	100. 0	100. 0	100. 0	100. 0

Bureau of Agricultural Economics. Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1929–1931, and official records of the Bureau of Foreign and Domestic Commerce.

TABLE 445.—*Vegetable oils: Exports from the United States, 1909–10 to 1930–31*

Year beginning July—	Corn	Cotton-seed	Linseed	Cocoa butter or butterine	Coconut	Peanut	Soybean
	1,000 pounds	*1,000 pounds*	*1,000 gallons*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
1909–10	11,299	223,955	228	----------	----------	----------	----------
1910–11	25,371	225,521	175	----------	----------	----------	----------
1911–12	23,866	399,471	247	----------	----------	----------	----------
1912–13	19,839	315,233	1,734	----------	----------	----------	----------
1913–14	18,282	192,963	239	----------	----------	----------	----------
1914–15	17,790	318,367	1,212	----------	----------	----------	----------
1915–16	8,968	266,512	714	----------	----------	----------	----------
1916–17	8,780	158,912	1,202	----------	----------	----------	----------
1917–18	1,831	100,780	1,188	----------	----------	----------	----------
1918–19	1,095	178,709	1,096	----------	----------	----------	----------
1919–20	12,483	159,400	1,136	11,048	141,088	4,922	67,782
1920–21	6,919	283,268	561	3,171	6,639	1,595	5,118
1921–22	5,280	91,615	366	1,856	10,185	1,802	537
1922–23	5,224	64,292	414	957	12,993	188	2,495
1923–24	4,196	39,418	350	888	19,423	168	2,892
1924–25	3,586	53,261	320	1,577	17,890	(1)	579
1925–26	2,927	59,015	311	1,766	15,444	(1)	623
1926–27	405	57,580	365	290	19,826	(1)	3,104
1927–28	329	61,470	296	1,897	22,358	(1)	7,514
1928–29	323	29,531	269	1,010	24,556	(1)	8,241
1929–30	363	31,998	284	347	30,225	(1)	5,509
1930–31 [2]	915	26,353	173	463	19,963	(1)	4,410

Bureau of Agricultural Economics. Compiled from Foreign Commerce and Navigation of the United States, 1910–1918; Montly Summary of Foreign Commerce of the United States, June issues, 1919–1931.

[1] Included with "Other vegetable oils and fats."
[2] Preliminary.

TABLE 446.—*Vegetable oils: Imports into the United States, 1909–10 to 1930–31*

Year beginning July—	Castor [1]	Chinese nut	Cocoa butter or butterine	Coconut	Cottonseed [1]	Linseed	Olive	Palm	Palm kernel	Peanut	Rapeseed	Soybean
	1,000 gals.	*1,000 gals.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 gals.*	*1,000 gals.*	*1,000 lbs.*	*1,000 lbs.*	*1,000 gals.*	*1,000 gals.*	*1,000 lbs.*
1909–10	7	[2] 5,760	3,370	48,346	(3)	(3)	4,545	92,772	(3)	(4)	[5] 1,083	(3)
1910–11	7	[2] 7,042	4,279	51,118	(3)	(3)	4,984	57,100	(3)	(4)	[5] 1,363	(3)
1911–12	8	4,768	6,075	46,371	1,513	737	5,473	47,159	25,393	896	1,183	28,021
1912–13	5	5,997	3,603	50,504	3,384	174	5,840	50,229	23,569	1,196	1,550	12,340
1913–14	189	4,932	2,839	74,386	17,293	192	6,981	58,040	34,328	1,337	1,464	16,360
1914–15	63	4,940	150	63,135	15,162	535	7,364	31,486	4,906	853	1,499	19,207
1915–16	253	4,968	400	66,008	17,181	50	8,109	40,497	6,761	1,475	2,561	98,120
1916–17	324	6,864	166	79,223	13,703	111	8,184	36,074	1,857	3,026	1,085	162,690
1917–18	1,175	4,816	(6)	259,195	14,291	51	2,652	27,405	19	8,289	3,056	336,825
1918–19	472	6,217	3	344,728	20,410	990	4,398	19,281	1,945	11,393	2,091	236,805
1919–20	271	10,614	42	271,540	24,165	4,550	7,029	50,165	54	22,064	1,230	195,774
1920–21	99	4,440	915	173,889	1,315	1,997	4,705	31,076	2,769	2,422	1,172	49,331
1921–22	46	7,410	7,123	230,236	(6)	22,494	11,112	39,159	--------	384	1,352	8,253
1922–23	185	11,919	3,010	212,573	45	7,568	15,635	118,816	--------	1,007	1,770	38,635
1923–24	36	10,786	1,169	181,230	(6)	2,379	15,121	86,784	1,126	2,008	2,068	17,631
1924–25	41	12,626	733	250,121	0	3,145	15,743	114,387	37,364	468	1,959	20,434
1925–26	66	11,315	14	200,878	283	2,231	18,368	152,254	85,074	450	2,088	17,401
1926–27	22	13,657	256	286,776	6,396	177	17,964	110,184	14,760	1,061	2,731	23,553
1927–28	125	11,150	18	273,309	1	46	15,746	183,977	56,021	648	2,604	14,562
1928–29	17	15,365	17	377,288	(6)	890	19,706	228,230	80,514	454	2,543	17,172
1929–30	16	17,459	270	370,600	2	722	21,149	237,860	41,380	262	2,152	13,333
1930–31 [7]	17	13,254	15	315,492	1	34	16,827	313,940	17,196	2,822	1,930	5,915

Bureau of Agricultural Economics. Compiled from Foreign Commerce and Navigation of the United States 1910–1918: Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1931.

[1] Imports for consumption. (See introduction to Agricultural Statistics.)
[2] Includes peanut oil.
[3] Included in all other fixed or expressed.
[4] Included in Chinese nut oil.
[5] Includes hempseed.
[6] Less thna 500 pounds.
[7] Preliminary.

Table 447.—*Oil cake and oil-cake meal: International trade, average 1925–1929, annual 1928—1930*

Country	Calendar year							
	Average 1925–1929		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
United States	1, 394, 589	196, 586	1, 186, 934	250, 786	1, 278, 525	334, 172	511, 392	134, 148
Russia	672, 830	0	322, 756	0	651, 036	0	614, 127	0
British India	584, 664	246	699, 241	320	705, 990	229	530, 085	177
Egypt	356, 706	3	347, 802	0	391, 092	0	503, 541	0
France	336, 094	75, 294	438, 107	75, 411	360, 341	102, 373	553, 794	90, 974
China	270, 571	0	287, 111	0	291, 910	0	300, 908	0
Italy	242, 957	603	324, 048	230	303, 662	436	134, 412	3, 665
Rumania	[2] 143, 450	[2] 9						
Argentina	139, 227	0	144, 049	0	146, 339	0	144, 238	0
Dutch East Indies	135, 473	0	171, 581	0	182, 958	0	[3] 135, 700	0
Peru	70, 465	0	79, 042	0	66, 540	0	78, 715	0
Brazil	54, 650	0	44, 407	0	58, 633	0	57, 387	0
Canada	45, 464	15, 863	44, 419	13, 930	51, 032	21, 931	35, 907	16, 559
Bulgaria	37, 520	10	46, 972	0	55, 701	30	77, 575	
Spain	28, 199	3, 754	13, 898	5, 116	10, 853	7, 545	5, 135	12, 572
British Malaya	14, 302	11, 530	18, 079	15, 770	17, 183	16, 858	12, 311	11, 933
Chile	7, 725	1	3, 780	0	5, 640	0		
Australia [4]	6, 921	2, 404	5, 711	6, 261	10, 210	938	7, 567	1, 068
Latvia	4, 355	0	2, 489	0	3, 058	0	11, 665	0
Total	4, 546, 162	306, 303	4, 180, 426	367, 824	4, 590, 703	484, 512	3, 714, 459	271, 096
PRINCIPAL IMPORTING COUNTRIES								
Denmark	26, 788	1, 558, 619	30, 050	1, 432, 965	31, 326	1, 612, 452		1, 464, 319
Germany	768, 849	1, 064, 314	972, 716	1, 205, 083	620, 202	1, 163, 887	594, 523	980, 524
United Kingdom	167, 379	1, 001, 960	208, 134	809, 899	160, 247	993, 657	134, 227	992, 080
Netherlands	120, 322	680, 253	120, 920	669, 165	133, 907	835, 947	141, 231	487, 119
Japan	43, 218	346, 965	58, 424	353, 768	78, 254	316, 707	23, 276	321, 335
Belgium	83, 183	324, 674	95, 929	334, 711	99, 879	337, 625	81, 111	391, 617
Sweden	12, 655	305, 454	9, 416	311, 856	18, 261	290, 655	28, 194	307, 963
Finland	0	183, 687	0	227, 575	0	163, 685	0	155, 683
Irish Free State	0	111, 617	0	106, 412	0	108, 652	0	110, 229
Czechoslovakia	54, 113	76, 079	46, 186	106, 306	59, 654	97, 314	97, 404	99, 771
Switzerland	13, 977	75, 127	17, 734	75, 052	12, 844	69, 505	16, 937	57, 948
Norway	984	63, 263	1	63, 481	4, 730	33, 812		49, 553
Poland	28, 545	56, 356	27, 397	84, 824	35, 885	69, 690	33, 685	45, 529
Ceylon	25, 251	42, 690	32, 650	42, 636	37, 344	40, 195	31, 234	35, 307
Austria	1, 411	31, 822	899	45, 513	1, 628	41, 111	1, 002	38, 518
Hungary	15, 310	16, 411	12, 043	29, 801	24, 675	27, 115	21, 048	27, 162
Total	1, 361, 985	5, 939, 297	1, 632, 499	5, 899, 047	1, 318, 836	6, 202, 009	1, 203, 872	5, 564, 657

Bureau of Agricultural Economics. Official sources except as otherwise noted. The class called here "Oil cake and oil-cake meal" includes the edible cake and meal remaining after making oil from such products as cotton seed, flaxseed, peanuts, corn, etc. Soybean cake is not included in this table.

[1] Preliminary. [2] 3-year average. [3] Java and Madura only. Year ending June 30.

TABLE 448.—*Rubber: International trade, average 1925–1929, annual 1928–1930*

Country	Calendar year							
	Average 1925–1929		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
British Malaya	931, 522	362, 113	920, 329	336, 932	1, 300, 117	362, 011	1, 247, 342	304, 331
Dutch East Indies	593, 755	0	602, 476	0	664, 555	0	616, 332	0
Ceylon	133, 621	11, 137	128, 328	11, 435	180, 632	13, 377	170, 946	11, 155
Brazil	46, 638	0	39, 214	0	39, 643	0	26, 689	0
British India	23, 532	100	24, 180	33	26, 259	271	24, 153	260
Indo-China	20, 509	[2] 29	21, 589	[2] 18	22, 727	[2] 60	----	----
British North Borneo	14, 419	0	15, 003	0	16, 534	0	----	0
Mexico	8, 440	[3] 422	6, 943	874	3, 261	----	2, 688	----
Bolivia	7, 474	[4] 1	7, 710	----	6, 818	----	----	----
Nigeria	3, 947	0	5, 139	0	4, 422	0	----	0
Kamerun [2]	3, 818	2	4, 979	0	4, 420	0	----	----
French Equatorial Africa	3, 242	[2] 211	[2] 3, 178	[2] 0	[2] 2, 365	[2] 212	----	----
Belgian Congo	2, 230	1	2, 342	0	1, 872	0	----	----
French Guinea	2, 046	[2] 30	[2] 1, 595	[2] 14	[2] 830	[2] 4	----	----
Switzerland	1, 939	1, 155	2, 279	1, 268	2, 624	1, 466	2, 566	1, 813
Ecuador	1, 756	0	734	0	409	0	318	0
Gold Coast	889	0	[2] 568	[2] 0	649	0	540	0
Peru	526	0	907	0	543	0	292	0
Angola	179	0	92	0	29	0	----	0
Total	1, 800, 482	375, 201	1, 787, 585	350, 574	2, 278, 709	377, 401	2, 091, 866	317, 559
PRINCIPAL IMPORTING COUNTRIES								
United States	0	1, 002, 031	0	978, 107	0	1, 262, 939	0	1, 089, 830
United Kingdom	0	124, 052	0	9, 829	0	275, 088	0	268, 805
France	16, 253	110, 282	18, 937	100, 658	8, 498	159, 545	6, 461	180, 849
Germany	6, 051	87, 825	8, 660	93, 455	7, 119	117, 054	11, 469	113, 365
Canada	0	59, 580	0	69, 220	0	79, 512	0	64, 492
Japan	0	50, 307	0	57, 898	0	76, 922	0	73, 710
Italy	351	27, 855	58	27, 903	81	36, 700	149	41, 735
Russia	0	23, 145	0	33, 975	0	28, 278	0	36, 173
Belgium	2, 719	16, 190	3, 039	21, 622	3, 851	24, 775	3, 232	27, 288
Spain	19	13, 958	2	19, 042	52	22, 077	23	27, 698
Netherlands	6, 267	10, 561	4, 527	9, 433	6, 525	13, 726	4, 737	11, 288
Austria	1, 283	7, 269	1, 185	8, 007	2, 066	9, 955	2, 322	7, 629
Sweden	144	5, 420	170	5, 218	107	8, 527	102	10, 097
Czechoslovakia	275	5, 348	304	7, 328	531	10, 948	----	----
Hungary	213	2, 291	559	3, 403	227	3, 316	134	3, 216
Denmark	4	1, 341	6	1, 261	1	1, 780	----	2, 573
China	0	1, 016	0	511	0	2, 557	0	1, 391
Total	33, 579	1, 548, 471	37, 447	1, 446, 870	29, 058	2, 133, 699	28, 634	1, 960, 139

Bureau of Agricultural Economics. Official sources except where otherwise noted. Figures for rubber include "India rubber," so called, caoutchouc, caucho, jebe (Peru), hule (Mexico), borracha, massaranduba, mangabeira, manicoba, sorva, and seringa (Brazil), gamelastiek (Dutch East Indies), caura, ser nambi (Venezuela).

[1] Preliminary.
[2] International Yearbook of Agricultural Statistics.
[3] 4-year average.
[4] 2-year average.

TABLE 449.—*Coffee: International trade, average 1925–1929, annual 1928–1930*

Country	Calendar year							
	Average 1925–1929		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Brazil	1,865,392	0	1,836,187	0	1,889,032	0	2,022,303	0
Colombia [2]	327,994	2	369,726	0	376,386	0	----------	----------
Dutch East Indies	187,523	3,035	252,494	3,286	180,368	2,247	[3] 39,622	[3] 70
Venezuela	118,217	0	84,401	0	141,907	0	----------	0
Guatemala	100,915	0	98,245	0	[2] 97,394	0	----------	0
Salvador	96,467	0	117,083	0	103,137	0	129,237	0
Haiti	72,395	0	84,579	0	[2] 62,956	0	----------	0
Mexico	53,058	419	69,688	211	[2] 38,091	(2)	67,681	202
Costa Rica	38,922	0	41,539	0	43,378	0	----------	0
Nicaragua	30,777	0	39,252	0	29,207	0	11,690	0
British India	22,540	4,662	28,556	4,944	11,567	6,417	4,833	34,894
Dominican Republic	9,311	0	10,014	0	12,142	0	----------	0
Jamaica	8,729	0	8,832	0	6,572	0	----------	0
Total	2,932,240	8,118	3,040,596	8,441	2,992,137	8,664	2,275,366	35,166
PRINCIPAL IMPORTING COUNTRIES								
United States	17,669	1,429,825	8,520	1,456,518	6,726	1,482,258	8,727	1,599,317
France	219	360,039	132	364,105	141	374,869	160	394,089
Germany	365	266,650	417	299,209	539	327,010	822	340,310
Netherlands	36,978	113,722	32,783	110,679	24,494	98,597	21,410	100,918
Italy	4	99,761	3	105,195	1	103,325	6	99,863
Sweden	25	90,654	49	94,777	18	90,349	87	99,198
Belgium	892	88,227	1,116	87,432	1,551	86,510	1,309	104,844
Denmark	564	53,588	765	56,494	704	55,758	743	60,307
Argentina	0	51,666	0	54,000	0	54,663	0	56,083
Spain	4	48,119	0	47,507	11	52,666	0	58,325
United Kingdom	235	40,698	262	37,203	265	46,050	----------	42,675
Finland	0	36,922	0	40,653	0	39,402	0	48,725
Norway [4]	32	35,572	0	36,739	162	33,996	----------	37,672
Czechoslovakia	3	29,068	2	28,495	1	29,885	25	30,289
Union of South Africa	13	28,306	16	26,631	19	28,538	13	28,951
Switzerland	201	27,926	270	27,668	297	29,516	424	30,423
Canada	57	25,811	47	28,143	84	28,468	66	31,181
Algeria	[5] 134	21,971	----------	23,588	----------	26,396	----------	27,871
Yugoslavia	5	21,180	1	21,192	1	21,466	1	20,154
Egypt	11	19,953	5	18,835	10	21,012	0	21,488
Cuba	1	19,382	1	11,731	2	18,528	23	12,200
Austria	6	18,368	7	19,156	6	20,693	5	19,842
British Malaya	9,010	17,046	7,070	14,648	5,555	14,219	5,023	14,099
Poland	6	15,819	13	16,210	16	17,854	8	17,379
Chile	0	14,385	0	12,290	0	11,109	0	11,568
Greece	0	11,544	0	11,527	0	12,186	0	12,870
Hungary	0	7,458	0	8,423	0	8,002	0	7,662
Ceylon	[6] 7	2,858	9	2,885	----------	3,344	----------	2,784
Bulgaria	0	1,874	0	1,897	0	1,687	0	1,556
Total	66,441	2,998,392	51,488	3,063,830	40,603	3,138,356	38,852	3,332,643

Bureau of Agricultural Economics. Official sources except where otherwise noted. The item, coffee, comprises unhulled and hulled, ground or otherwise prepared, but imitation or "surrogate" coffee and chicory are excluded.

[1] Preliminary.
[2] International Yearbook of Agricultural Statistics.
[3] Java and Madura only.
[4] Includes a small amount of surrogate.
[5] 2-year average.
[6] 4-year average.

TABLE 450.—*Tea: International trade, average 1925–1929, annual 1927–1930*

Country	Calendar year									
	Average 1925–1929		1927		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
British India	364, 848	8, 260	375, 949	7, 839	364, 686	10, 164	388, 493	8, 461	365, 344	8, 660
Ceylon	228, 444	1	227, 038	2	236, 719	1	251, 490	[2] 1	243, 107	-------
Dutch East Indies	124, 947	8, 434	127, 292	7, 995	135, 058	9, 339	139, 930	9, 123	[3] 116, 835	[3] 7, 800
China	116, 300	8, 214	114, 651	8, 809	123, 150	13, 030	125, 695	5, 010	91, 358	3, 029
Japan	24, 631	1, 009	23, 487	882	24, 004	1, 027	23, 660	1, 244	20, 316	1, 152
Formosa	20, 431	66	22, 156	83	18, 893	71	17, 668	92	-------	-------
Total	879, 601	25, 984	890, 573	25, 610	902, 510	33, 632	946, 936	23, 931	836, 960	20, 641
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom	0	429, 507	0	451, 415	0	418, 831	0	464, 145	0	452, 764
United States	0	93, 052	0	89, 169	0	89, 824	0	89, 373	0	84, 926
Australia [2]	0	49, 242	0	49, 672	0	49, 076	0	50, 576	0	-------
Russia	0	43, 287	0	33, 741	0	64, 590	0	63, 029	0	53, 411
Canada	0	38, 268	0	38, 117	0	39, 527	0	38, 677	0	50, 886
Netherlands	29	26, 144	28	27, 694	26	28, 186	40	28, 716	93	29, 587
Irish Free State	0	23, 220	0	23, 667	0	22, 649	0	23, 580	0	23, 962
Persia [4]	742	14, 925	470	13, 090	161	15, 662	506	16, 280	-------	-------
Morocco	0	12, 770	0	11, 333	0	12, 524	0	16, 788	0	12, 688
New Zealand	0	11, 159	0	10, 825	0	11, 149	0	12, 061	0	10, 178
Union of South Africa	218	11, 122	253	11, 812	239	11, 585	261	12, 095	83	12, 332
Germany	0	11, 037	0	11, 409	0	11, 786	0	12, 723	-------	13, 320
Egypt	259	10, 814	233	8, 605	291	14, 318	248	13, 093	[5] 97	[5] 12,200
British Malaya	1, 323	10, 491	1, 239	10, 778	1, 326	9, 973	1, 217	11, 378	925	9, 694
Chile	4	5, 156	6	4, 653	5	5, 767	8	5, 700	-------	4, 908
Indo-China	2, 164	4, 827	1, 711	5, 071	2, 065	5, 098	[2] 2, 232	[2] 4, 313	-------	-------
Poland	15	4, 428	1	4, 621	0	5, 025	73	4, 839	7	4, 533
Argentina	0	3, 867	0	4, 101	0	4, 211	0	4, 213	0	3, 874
France	82	3, 456	48	3, 022	57	3, 352	69	3, 494	38	3, 278
Algeria	15	2, 140	[2] 1	1, 714	[2] 27	2, 513	[2] 21	2, 650	-------	2, 647
Czechoslovakia	3	1, 492	2	1, 455	1	1, 597	1	1, 606	0	1, 365
Denmark	0	1, 276	0	1, 261	0	1, 340	0	1, 267	0	1, 218
Austria	1	1, 236	0	1, 278	1	1, 360	2	1, 430	2	1, 150
Yugoslavia	0	869	0	759	0	902	0	913	2	647
Hungary	5	777	0	884	0	902	0	836	0	585
Total	4, 860	814, 562	3, 992	820, 146	4, 199	831, 747	4, 678	883, 775	1, 247	790, 153

Bureau of Agricultural Economics. Official sources except where otherwise noted. These figures are for tea leaves only; tea dust and sweepings and yerbe maté are not included.

[1] Preliminary.
[2] International Yearbook of Agricultural Statistics.
[3] Java and Madura only.
[4] Year ending March 20 of following year.
[5] Includes yerbe maté and imitation tea.

TABLE 451.—*Copra and coconut oil: International trade, average 1925–1929, annual 1928–1930*

COPRA

Country	Calendar year							
	Average 1925–1929		1928		1929		1930 [1]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*	*1,000 pounds*
Dutch East Indies	851, 367	6	971, 900	3	1, 007, 214	22	828, 306	409
Philippine Islands	409, 191	1, 017	516, 795	2, 273	382, 658	1, 975	384, 263	964
British Malaya	386, 704	169, 135	409, 602	195, 395	444, 949	192, 506	429, 417	200, 198
Ceylon	239, 555	502	221, 386	346	228, 759	[2] 656	203, 011	---------
Fiji	62, 601	0	62, 601	0	74, 426	0	53, 496	0
Solomon Islands [2]	48, 372	0	52, 097	0	47, 678	0	---------	0
Mozambique	40, 469	0	41, 685	0	44, 124	0	---------	0
Zanzibar	36, 278	11, 050	34, 704	13, 740	37, 416	11, 367	28, 668	10, 926
Tonga	32, 048	0	35, 103	0	37, 769	0	---------	0
Samoa, West	30, 179	0	35, 815	0	28, 990	0	---------	0
Tanganyika	17, 685	0	20, 872	0	17, 441	0	---------	0
Trinidad and Tobago	16, 331	1, 193	21, 352	220	23, 980	2, 298	21, 891	1, 893
Gilbert and Ellice Islands [3]	10, 482	0	10, 524	0	9, 233	0	---------	0
Total	2, 181, 262	182, 903	2, 434, 436	211, 977	2, 384, 937	208, 824	1, 949, 052	214, 390
PRINCIPAL IMPORTING COUNTRIES								
United States	0	469, 115	0	501, 990	0	570, 913	0	595, 338
Germany	777	442, 523	16	442, 593	1, 544	539, 130	25	332, 356
France	145	364, 155	40	405, 174	628	421, 130	64	437, 616
Netherlands	791	308, 530	689	302, 201	1, 617	309, 245	945	213, 463
United Kingdom	0	124, 434	0	89, 484	0	147, 403	0	150, 830
Denmark	0	122, 840	0	133, 386	0	154, 339	0	154, 088
Australia [2]	0	71, 419	0	66, 238	0	60, 554	0	---------
Italy	9	61, 352	5	58, 516	8	78, 012	11	71, 183
Norway	0	43, 568	0	45, 994	0	52, 430	0	69, 888
Austria	6	28, 765	0	29, 639	0	27, 905	0	27, 598
Sweden	0	24, 518	0	21, 462	0	12, 026	0	8, 758
Belgium	113	18, 169	101	13, 628	50	24, 009	37	18, 010
Latvia	0	3, 496	0	3, 655	0	4, 993	0	5, 121
British India	1, 284	2, 926	226	3, 736	271	341	204	1, 304
Total	3, 125	2, 085, 810	1, 077	2, 117, 696	4, 118	2, 402, 430	1, 286	2, 085, 553

COCONUT OIL

Country	Average 1925–1929 Exports	Average 1925–1929 Imports	1928 Exports	1928 Imports	1929 Exports	1929 Imports	1930 [1] Exports	1930 [1] Imports
PRINCIPAL EXPORTING COUNTRIES								
Philippine Islands	308, 196	0	313, 589	0	420, 019	0	324, 880	0
Netherlands	121, 614	9, 639	124, 479	3, 199	134, 128	9, 674	99, 333	3, 052
Ceylon	78, 807	13	87, 261	10	98, 395	[2] 15	85, 543	---------
Dutch East Indies	42, 689	10, 562	72, 634	9, 342	68, 240	9, 935	31, 904	11, 496
Germany	33, 181	11, 254	41, 955	13, 791	64, 056	23, 176	25, 874	18, 942
France	29, 644	10, 076	30, 185	7, 276	33, 015	10, 734	24, 922	10, 956
British India	20, 223	58	22, 154	13	19, 441	9	21, 217	67
Australia [2]	398	250	295	214	432	168	---------	---------
Total	634, 752	41, 852	692, 552	33, 845	837, 726	53, 711	613, 673	44, 513
PRINCIPAL IMPORTING COUNTRIES								
United States	21, 691	294, 849	24, 653	290, 637	29, 532	411, 936	25, 107	317, 919
United Kingdom	7, 473	105, 560	9, 072	141, 142	10, 779	144, 072	5, 757	94, 512
Belgium [4]	5, 924	34, 156	6, 631	34, 017	7, 619	39, 751	1, 858	18, 470
Sweden	3, 365	32, 563	2, 791	37, 497	1, 118	45, 607	1, 590	46, 492
Denmark	25, 414	27, 069	33, 420	23, 531	42, 820	21, 834	44, 873	15, 699
British India	1, 037	12, 054	709	21, 014	812	16, 858	433	8, 217
Egypt	1	11, 470	2	11, 502	0	12, 675	---------	5, 786
Italy [4]	102	8, 724	138	12, 338	31	11, 392	101	8, 496
Rumania	[5] 2	[5] 1, 553	0	---------	---------	---------	---------	---------
New Zealand	0	896	0	814	0	1, 186	0	797
Canada	0	739	0	656	0	1, 891	0	936
Portuguese India [2]	2	50	0	8	1	7	---------	---------
Total	65, 011	529, 683	77, 416	573, 156	92, 712	707, 209	79, 719	517, 324

Bureau of Agricultural Economics. Official sources except where otherwise noted.

[1] Preliminary.
[2] International Yearbook of Agricultural Statistics.
[3] Year ending June 30.
[4] Includes some other oils.
[5] 3-year average.

TABLE 452.—*Crop summary: Acreage, production, and yield per acre, 1929–1931*

Crop	Acreage 1929	Acreage 1930	Acreage 1931	Production Unit	Production 1929	Production 1930	Production 1931	Yield per acre 1929	Yield per acre 1930	Yield per acre 1931
	1,000 acres	*1,000 acres*	*1,000 acres*		*Thousands*	*Thousands*	*Thousands*			
Corn	97,806	100,743	104,970	Bushel	2,535,386	2,060,185	2,556,863	25.9	20.4	24.4
All wheat	62,671	61,138	54,949	do	812,573	858,160	892,271	13.0	14.0	16.2
Oats	38,148	39,729	39,722	do	1,118,414	1,277,764	1,112,142	29.3	32.2	28.0
Barley	13,523	12,662	11,471	do	280,242	304,601	198,965	20.7	24.1	17.3
Rye	3,054	3,543	3,143	do	34,950	45,379	32,746	11.4	12.8	10.4
Buckwheat	627	573	502	do	8,692	6,962	8,875	13.9	12.2	17.7
Flaxseed	3,047	3,732	2,313	do	15,910	21,240	11,018	5.2	5.7	4.8
Rice (4 States)	860	959	970	do	40,604	44,299	45,014	47.2	46.2	46.4
Grain sorghums	6,131	6,586	7,152	do	81,041	64,416	104,529	13.2	9.8	14.6
Hay, tame	55,019	52,622	53,449	Ton	76,114	63,463	64,233	1.38	1.21	1.20
Hay, wild	13,586	13,793	11,977	do	11,194	10,751	8,133	.82	.78	.68
All hay	68,605	66,415	65,426	do	87,308	74,214	72,366	1.27	1.12	1.11
Sweet sorghum (forage and hay)[1]	1,850	1,818	2,333	do	3,253	2,760	3,676	1.76	1.52	1.58
Clover seed (red and alsike)	1,789	1,076	885	Bushel	2,627	1,523	1,222	1.47	1.42	1.38
Sweet clover seed	276	219	218	do	1,167	848	760	4.24	3.88	3.48
Lespedeza seed	52	42	56	do	199	128	238	3.78	3.07	4.22
Alfalfa seed	401	420	354	do	982	1,145	853	2.45	2.73	2.41
Timothy seed	407	428	483	do	1,378	1,740	2,046	3.39	4.06	4.24
Beans, dry edible	1,836	2,091	1,860	Bag[2]	12,240	13,759	12,705	[3] 11.2	[3] 11.0	[3] 11.5
Soybeans[4]	886	1,162	1,271	Bushel	11,944	15,416	18,885	13.5	13.3	14.9
Cowpeas[4]	611	674	1,016	do	5,479	5,922	10,468	9.0	8.8	10.3
Velvet beans	1,219	1,201	1,044	Ton	543	470	382	[5] 891	[5] 783	[5] 732
Peanuts	2,001	1,862	2,172	Pound	1,341,416	1,176,700	1,554,410	670	632	716
Potatoes	2,978	3,038	3,382	Bushel	329,134	333,210	376,248	110.5	109.7	111.3
Sweetpotatoes	646	648	778	do	64,963	53,663	62,904	100.6	82.8	80.9
Tobacco	1,987	2,101	2,020	Pound	1,537,193	1,635,210	1,610,098	774	778	797
Cotton	45,793	45,091	40,495	Bale	14,828	13,932	16,918	[5] 155.0	[5] 147.7	[5] 200.1
Cottonseed	-------	-------	-------	Ton	6,590	6,185	7,523	-------	-------	-------
Broomcorn	310	391	309	do	47	50	48	[5] 305	[5] 255	[5] 310
Hops	24	20	21	Pound	33,195	23,447	25,852	1,360	1,202	1,208
Pecans	-------	-------	-------	do	51,388	46,469	74,985	-------	-------	-------
Sugar beets	688	775	720	Ton	7,315	9,199	7,933	10.6	11.9	11.0
Sugarcane (La.)	186	187	188	do	3,423	3,101	2,760	18.4	16.6	14.7
Cane sirup	104	104	104	Gallon	19,335	16,834	14,859	185.9	161.9	142.9
Sorgo sirup	150	165	259	do	9,256	8,916	17,818	61.7	54.0	68.8
Maple sugar	[6] 12,906	[6] 13,113	[6] 12,218	Pound	1,344	2,430	1,653	[7] .10	[7] .19	[7] .14
Maple sirup	[6] 12,906	[6] 13,113	[6] 12,218	Gallon	2,346	3,635	2,157	[7] .18	[7] .28	[7] .18
Fruit crops:										
Apples, total	-------	-------	-------	Bushel	135,622	155,982	211,506	-------	-------	-------
Apples, commercial	-------	-------	-------	Barrel	28,843	33,668	34,732	-------	-------	-------
Peaches, total	-------	-------	-------	Bushel	45,026	[8] 53,864	[8] 77,743	-------	-------	-------
Pears, total	-------	-------	-------	do	21,172	[8] 25,540	[8] 23,009	-------	-------	-------
Grapes, total[9]	-------	-------	-------	Ton	2,080	[8] 2,439	[8] 1,583	-------	-------	-------
Cherries (10 States)	-------	-------	-------	do	93	115	108	-------	-------	-------
Plums and prunes fresh (4 States)	-------	-------	-------	do	117	148	[8] 118	-------	-------	-------
Prunes, dried (4 States)	-------	-------	-------	do	161	[8] 296	204	-------	-------	-------
Oranges (7 States)	-------	-------	-------	Box	34,034	54,559	50,814	-------	-------	-------
Grapefruit (4 States)	-------	-------	-------	do	11,095	18,690	14,770	-------	-------	-------
Lemons (Calif.)	-------	-------	-------	do	5,900	7,950	8,000	-------	-------	-------
Cranberries	29	28	28	Barrel	549	560	651	19.2	20.2	23.5
Commercial truck crops:										
Artichokes	9	8	8	Box	988	1,011	818	111	124	109
Asparagus[10]	92	97	103	Crate	9,472	10,524	9,307	103	108	91
Beans, Lima	5	10	8	Bushel	348	587	549	75	59	66
Beans, snap[10]	159	189	168	Ton	200	214	184	1.25	1.13	1.10
Beets	9	10	11	Bushel	1,445	1,903	2,434	164	192	223
Cabbage[10]	143	149	146	Ton	1,036	998	993	7.25	6.70	6.80
Cantaloupes	109	129	138	Crate	17,393	15,951	17,962	160	123	130
Carrots[10]	27	28	30	Bushel	10,225	10,662	11,833	383	381	390
Cauliflower	25	28	28	Crate	6,797	5,843	7,087	271	212	254
Celery	32	34	33	do	9,418	10,419	9,750	296	307	292

See footnotes at end of table.

TABLE 452.—*Crop summary: Acreage, production, and yield per acre, 1929–1931*—Continued

Crop	Acreage			Production				Yield per acre		
	1929	1930	1931	Unit	1929	1930	1931	1929	1930	1931
	1,000 acres	*1,000 acres*	*1,000 acres*		*Thousands*	*Thousands*	*Thousands*			
Corn, sweet [11]	379	399	374	Ton	743	699	808	1.96	1.75	2.16
Cucumbers [10]	122	174	138	Bushel	8,635	13,842	10,757	71	80	78
Eggplant	3	4	4	do	688	798	775	232	222	207
Kale	2	2	2	do	810	738	480	450	410	200
Lettuce	139	173	177	Crate	20,220	19,591	18,569	145	113	105
Onions	87	83	77	Bushel	25,489	26,002	18,857	292	313	246
Peas, green [10]	301	348	309	Ton	294	354	248	.98	1.02	.80
Peppers	15	17	19	Bushel	3,425	3,690	4,623	222	213	248
Pimientos	9	9	7	Ton	19,350	15,340	9,080	2.15	1.72	1.37
Potatoes, early	269	325	347	Bushel	34,839	43,551	46,381	130	134	134
Spinach [10]	68	56	57	Ton	247	152	172	3.62	2.72	2.99
Strawberries [10]	203	178	154	Crate [12]	13,810	9,637	11,286	67.9	54.2	73.1
Tomatoes [10]	461	560	448	Ton	1,982	2,217	1,476	4.30	3.96	3.29
Watermelons	217	235	239	Number	70,056	82,401	75,509	323	350	316
Total truck crops (except potatoes)	2,616	2,920	2,678							
For market (except potatoes)	1,469	1,590	1,606							
For manufacture	1,147	1,330	1,072							
Total all crops with duplications eliminated	357,827	359,927	350,672							

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Not included in tame hay.
[2] 100-pound bags.
[3] Bushels of 60 lbs.
[4] Total except hay.
[5] Pounds.
[6] Trees tapped.
[7] Per tree.
[8] Includes some quantities not harvested.
[9] Production is the total for fresh fruit, juice, and raisins.
[10] Includes production used for canning or manufacture.
[11] Mainly for canning but includes also market for New Jersey.
[12] Crates containing 24 quarts.

TABLE 453.—*Indexes of the volume of net agricultural production,*[1] *1919–1931*

[1919–1927=100]

Year	Grains	Fruits and vegetables	Truck crops	Meat animals	Dairy products	Poultry products	Cotton and cottonseed	Total
	Index no.	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*
1919	101	82	71	96	81	85	91	91
1920	116	102	86	92	80	84	105	97
1921	100	76	74	91	91	95	64	87
1922	100	109	101	97	95	98	77	96
1923	97	108	99	107	103	107	80	101
1924	100	106	111	108	109	100	108	106
1925	95	98	115	102	110	104	128	106
1926	93	116	114	103	114	111	143	111
1927	97	104	129	103	116	116	103	106
1928	106	122	124	105	119	112	114	111
1929	87	102	141	105	122	116	118	109
1930	85	112	137	99	122	119	113	107
1931 [2]	85	116	132	100	122	121	131	111

Bureau of Agricultural Economics.

[1] These indexes are based on estimates of production for sale and for consumption in the farm home. Production fed to livestock or used for seed is not included. For example, instead of total production, only the amounts of corn and oats shipped out of county where grown and only a small percentage of the hay crops are included. The index of dairy products represents total milk production for all purposes. Production of meat animals is represented by total slaughter, including slaughter for farm use. Calendar-year production of livestock and livestock products are here compared with crop production of the same year. Each group index as well as the total is obtained by multiplying the yearly quantities by a 1919–1927 average farm price received by producers for each of the commodities, and the sum of these yearly values at average prices, divided by the corresponding average sum for the period 1919–1927, taken as 100. The following commodities included in the index contribute about 90 per cent of the gross income from agricultural production: Grains—wheat, corn, oats, barley, rye, buckwheat, kafir, rice; fruits and vegetables—grapes, apples, apricots, peaches, pears, cranberries, figs, grapefruit, lemons, olives, oranges, potatoes, sweetpotatoes, dry edible beans; truck crops—asparagus, snap beans, cabbage, cantaloupes, cauliflower, celery, cucumbers, lettuce, onions, peas, spinach, strawberries, tomatoes, watermelons; meat animals—cattle, calves, sheep, lambs, hogs; dairy products—milk total production; poultry products—chickens and eggs; cotton and cottonseed; total includes also tobacco, wool, and hay.

[2] Preliminary.

TABLE 454.—*Acreage of 52 crops and value of 75 crops, by States, 1929, 1930, and 1931*

State and division	Acreage of 52 crops			Value of 75 crops [1]		
	1929	1930	1931	1929	1930	1931
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
Maine	1,354	1,336	1,332	79,077	45,804	24,013
New Hampshire	392	383	377	9,447	8,997	6,667
Vermont	1,078	1,062	1,067	23,672	22,207	17,733
Massachusetts	440	425	421	28,862	24,787	19,382
Rhode Island	51	49	48	2,608	2,320	1,665
Connecticut	364	357	347	27,130	25,449	17,261
New York	6,727	6,524	6,496	195,997	179,748	126,065
New Jersey	711	707	694	51,024	50,214	34,068
Pennsylvania	6,299	6,263	6,219	184,702	162,557	123,795
North Atlantic	17,415	17,106	17,001	602,519	522,083	370,649
Ohio	9,760	9,708	9,975	228,323	167,371	145,100
Indiana	10,088	10,264	10,572	201,512	153,970	109,649
Illinois	18,477	18,529	18,716	386,840	272,949	195,585
Michigan	7,307	7,371	7,444	169,884	145,755	97,826
Wisconsin	9,506	9,572	9,484	225,548	198,897	121,778
Minnesota	18,274	18,376	18,703	311,976	231,340	146,761
Iowa	22,203	22,430	22,168	501,571	372,138	224,513
Missouri	12,960	13,197	13,366	226,008	148,872	126,958
North Dakota	21,724	21,287	15,624	188,758	121,507	52,484
South Dakota	17,682	18,220	14,850	186,572	116,662	41,728
Nebraska	21,345	21,908	21,880	328,350	244,589	140,946
Kansas	24,145	24,600	25,056	307,222	199,936	163,072
North Central	193,471	195,462	187,838	3,262,564	2,373,986	1,566,401
Delaware	383	386	385	14,617	11,012	8,414
Maryland	1,691	1,673	1,672	62,590	41,072	39,480
Virginia	3,752	3,671	3,834	145,383	84,620	78,263
West Virginia	1,478	1,373	1,448	43,138	25,569	27,043
North Carolina	6,241	6,364	6,378	257,955	213,647	136,496
South Carolina	4,672	4,771	4,731	141,068	118,993	71,438
Georgia	9,461	9,453	9,558	228,978	179,422	101,898
Florida	1,379	1,419	1,487	111,590	124,482	86,485
South Atlantic	29,057	29,110	29,493	1,005,319	798,817	549,517
Kentucky	5,204	4,966	5,340	172,212	97,616	102,497
Tennessee	6,048	5,985	6,151	179,222	112,079	89,691
Alabama	7,568	7,945	8,143	194,099	139,392	88,908
Mississippi	6,756	6,787	7,008	252,167	129,209	97,913
Arkansas	6,866	6,874	6,927	204,289	84,681	107,844
Louisiana	4,471	4,428	4,451	154,678	101,616	81,883
Oklahoma	15,552	14,938	15,622	242,316	126,613	108,328
Texas	31,398	31,765	32,442	595,690	410,992	304,659
South Central	83,863	83,688	86,084	1,994,673	1,202,198	981,723
Montana	7,755	7,759	4,944	88,635	57,858	32,751
Idaho	3,024	3,012	2,851	99,610	74,959	49,076
Wyoming	1,993	2,044	1,784	33,159	26,951	16,967
Colorado	6,640	7,046	6,563	130,676	120,717	61,081
New Mexico	1,460	1,378	1,531	35,243	19,955	18,150
Arizona	483	516	480	39,990	27,443	16,516
Utah	1,122	1,171	1,115	33,263	26,873	20,027
Nevada	393	393	240	9,991	6,506	3,152
Washington	3,442	3,479	3,575	143,368	102,141	76,070
Oregon	2,679	2,644	2,577	89,278	60,047	44,694
California	5,029	5,119	4,596	520,206	398,315	316,076
Western	34,020	34,561	30,256	1,223,419	921,765	654,560
United States	357,827	359,927	350,672	8,088,494	5,818,849	4,122,850

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

[1] Values are based upon Dec. 1 prices or seasonal prices to December and differ from prices used in Tables 455 and 456.

TABLE 455.—*Farm value, gross income, and cash income from farm production, average, 1924–1928 and 1930*

State	Farm value [1]				Gross income [2]			
	Crops		Livestock and livestock products		Crops		Livestock and livestock products	
	Average, 1924–1928	1930	Average, 1924–1928	1930	Average, 1924–1928	1930	Average, 1924–1928	1930
	1,000 dollars	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
Maine	76, 366	67, 662	31, 741	31, 324	49, 518	46, 034	31, 135	30, 522
New Hampshire	22, 033	18, 158	19, 765	21, 270	11, 356	10, 870	19, 311	20, 839
Vermont	41, 125	34, 979	39, 887	41, 767	16, 065	15, 050	38, 930	40, 624
Massachusetts	50, 422	46, 152	41, 989	44, 814	34, 939	34, 313	40, 490	43, 658
Rhode Island	5, 352	4, 494	6, 540	7, 405	3, 457	3, 213	6, 279	7, 239
Connecticut	38, 925	37, 281	33, 796	37, 167	26, 134	27, 283	32, 786	36, 000
New York	295, 342	260, 187	254, 075	261, 828	165, 141	146, 601	243, 421	252, 864
New Jersey	77, 198	71, 573	46, 516	45, 711	60, 936	58, 498	44, 737	44, 714
Pennsylvania	272, 103	225, 724	209, 660	216, 632	130, 877	106, 276	203, 480	213, 918
Ohio	319, 435	213, 727	274, 271	240, 254	146, 000	88, 388	268, 537	239, 137
Indiana	263, 787	179, 811	233, 675	218, 031	110, 895	74, 058	229, 671	214, 394
Illinois	495, 909	321, 769	353, 515	324, 128	245, 044	154, 701	352, 707	319, 864
Michigan	245, 381	188, 750	184, 445	166, 772	123, 295	90, 483	178, 053	163, 957
Wisconsin	295, 478	241, 549	329, 260	309, 699	84, 880	69, 330	321, 781	297, 098
Minnesota	346, 961	245, 454	317, 324	305, 675	134, 166	84, 606	308, 010	293, 652
Iowa	524, 332	354, 453	561, 976	535, 069	138, 273	83, 031	565, 485	518, 243
Missouri	329, 091	180, 275	291, 937	261, 122	127, 094	70, 964	292, 481	258, 876
North Dakota	269, 931	133, 584	84, 025	81, 100	177, 782	77, 125	82, 760	74, 136
South Dakota	198, 725	124, 016	154, 068	155, 243	75, 780	40, 803	157, 720	147, 839
Nebraska	345, 849	250, 997	288, 324	287, 020	134, 304	96, 895	292, 704	280, 499
Kansas	371, 052	220, 320	238, 690	239, 351	210, 708	111, 301	237, 615	231, 069
Delaware	18, 261	13, 927	9, 114	9, 074	12, 162	9, 587	8, 711	8, 971
Maryland	81, 494	52, 051	44, 369	45, 541	52, 114	33, 269	42, 140	44, 516
Virginia	198, 318	123, 844	83, 990	77, 407	131, 373	85, 750	82, 435	77, 580
West Virginia	81, 761	50, 868	50, 186	46, 894	41, 251	29, 297	49, 393	47, 849
North Carolina	373, 622	272, 128	77, 916	67, 561	294, 587	199, 700	77, 996	65, 435
South Carolina	183, 605	145, 582	36, 004	30, 649	142, 732	104, 252	37, 005	30, 386
Georgia	291, 234	235, 338	74, 889	63, 519	207, 842	160, 722	75, 834	62, 837
Florida	109, 062	122, 238	20, 952	19, 887	93, 769	109, 053	22, 073	20, 685
Kentucky	220, 474	133, 729	114, 494	87, 064	118, 675	86, 676	113, 479	92, 065
Tennessee	229, 224	157, 778	95, 213	81, 208	137, 045	92, 060	95, 426	80, 921
Alabama	251, 528	174, 008	57, 582	48, 038	186, 706	125, 626	57, 934	48, 450
Mississippi	265, 172	149, 391	53, 255	48, 115	214, 584	117, 905	53, 436	45, 847
Arkansas	238, 184	110, 969	60, 127	44, 109	183, 614	85, 580	59, 396	45, 928
Louisiana	166, 427	117, 230	32, 499	27, 962	134, 609	94, 147	32, 467	27, 119
Oklahoma	326, 779	143, 098	114, 637	108, 104	240, 298	87, 204	109, 139	101, 710
Texas	780, 789	464, 071	228, 578	214, 290	623, 128	324, 385	225, 343	207, 311
Montana	123, 024	64, 588	70, 740	66, 166	75, 087	29, 924	68, 221	62, 817
Idaho	101, 058	83, 771	54, 554	49, 411	64, 306	53, 158	53, 482	46, 090
Wyoming	31, 519	29, 674	41, 420	38, 408	13, 286	13, 737	39, 508	34, 176
Colorado	126, 936	123, 615	79, 540	76, 562	77, 581	78, 445	79, 827	76, 704
New Mexico	30, 352	21, 300	34, 455	29, 780	20, 054	13, 803	36, 704	27, 879
Arizona	38, 079	38, 624	22, 365	23, 042	30, 354	31, 315	26, 879	18, 009
Utah	42, 747	35, 176	38, 102	33, 861	25, 781	20, 405	37, 467	32, 589
Nevada	9, 137	7, 667	16, 433	11, 687	2, 976	2, 304	17, 243	11, 619
Washington	155, 371	128, 689	73, 787	76, 985	117, 171	96, 461	71, 426	73, 870
Oregon	95, 503	82, 103	67, 708	63, 253	64, 811	54, 001	66, 759	60, 260
California	484, 973	455, 603	185, 471	194, 079	412, 589	397, 290	182, 739	189, 248
United States	[3] 9,942, 938	[4] 6,964, 022	5, 833, 858	5, 514, 038	[3] 5,928, 638	[4] 4,031, 926	5, 770, 554	5, 370, 013

See footnotes at end of table.

TABLE 455.—*Farm value, gross income, and cash income from farm production, average, 1924–1928 and 1930*—Continued.

State	Gross income [2]		Cash income [5]					
	Crops and livestock combined		Crops		Livestock and livestock products		Crops and livestock combined	
	Average, 1924–1928	1930	Average, 1924–1928	1930	Average, 1924–1928	1930	Average, 1924–1928	1930
	1,000 dollars	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
Maine	80, 653	76, 556	41, 638	39, 100	24, 362	24, 735	66, 000	63, 835
New Hampshire	30, 667	31, 709	8, 003	7, 961	16, 800	18, 613	24, 803	26, 574
Vermont	54, 996	55, 674	10, 956	10, 575	35, 594	37, 243	46, 549	47, 818
Massachusetts	75, 429	77, 971	29, 345	29, 512	35, 327	39, 051	64, 672	68, 563
Rhode Island	9, 736	10, 452	2, 866	2, 728	5, 596	6, 583	8, 462	9, 311
Connecticut	58, 920	63, 283	22, 084	23, 930	28, 354	32, 254	50, 438	56, 184
New York	408, 561	399, 465	140, 725	125, 620	214, 037	226, 948	354, 762	352, 568
New Jersey	105, 673	103, 212	56, 491	54, 550	39, 417	40, 021	95, 907	94, 571
Pennsylvania	334, 356	320, 194	98, 214	75, 826	164, 398	179, 953	262, 612	255, 779
Ohio	414, 536	327, 525	118, 103	64, 362	219, 990	198, 251	338, 093	262, 613
Indiana	340, 567	288, 452	93, 388	58, 508	190, 616	181, 383	284, 004	239, 891
Illinois	597, 752	474, 565	223, 420	135, 735	303, 047	277, 724	526, 466	413, 459
Michigan	301, 348	254, 440	98, 640	69, 112	149, 254	139, 079	247, 894	208, 191
Wisconsin	406, 661	366, 428	60, 599	47, 794	292, 791	271, 942	353, 390	319, 736
Minnesota	442, 176	378, 258	115, 530	67, 471	272, 132	262, 552	387, 661	330, 023
Iowa	703, 758	601, 274	118, 700	65, 483	518, 824	478, 265	637, 524	543, 748
Missouri	419, 575	329, 840	97, 470	46, 785	239, 528	215, 293	336, 998	262, 078
North Dakota	260, 542	151, 261	172, 716	72, 296	65, 101	59, 062	237, 817	131, 358
South Dakota	233, 500	188, 642	71, 046	35, 948	140, 630	132, 748	211, 676	168, 696
Nebraska	427, 007	377, 394	125, 502	89, 268	265, 259	255, 639	390, 761	344, 907
Kansas	448, 323	342, 370	200, 452	102, 946	204, 373	200, 192	404, 825	303, 138
Delaware	20, 873	18, 558	10, 596	8, 176	7, 077	7, 489	17, 674	15, 665
Maryland	94, 254	77, 785	44, 592	26, 933	32, 197	35, 474	76, 789	62, 407
Virginia	213, 808	163, 330	103, 244	61, 296	47, 470	48, 024	150, 714	109, 320
West Virginia	90, 644	77, 146	25, 341	15, 687	31, 704	32, 308	57, 045	47, 995
North Carolina	372, 583	265, 135	256, 403	166, 394	29, 692	24, 192	286, 096	190, 586
South Carolina	179, 737	134, 638	121, 619	85, 433	10, 481	8, 683	132, 100	94, 116
Georgia	283, 675	223, 559	175, 692	132, 925	27, 298	24, 725	202, 990	157, 650
Florida	115, 842	129, 738	88, 026	104, 394	15, 494	14, 891	103, 520	119, 285
Kentucky	232, 154	178, 741	91, 625	64, 045	67, 936	57, 312	159, 561	121, 357
Tennessee	232, 472	172, 981	107, 322	66, 347	51, 011	45, 520	158, 333	111, 867
Alabama	244, 640	174, 076	158, 275	101, 804	18, 371	16, 231	176, 646	118, 035
Mississippi	268, 020	163, 752	191, 947	98, 608	23, 051	19, 411	214, 998	118, 019
Arkansas	243, 010	131, 508	160, 716	65, 884	26, 622	20, 573	187, 338	86, 457
Louisiana	167, 076	121, 266	124, 055	85, 177	16, 347	12, 312	140, 402	97, 489
Oklahoma	349, 436	188, 914	227, 179	76, 524	71, 802	70, 198	298, 981	146, 722
Texas	848, 472	531, 696	596, 299	301, 556	148, 898	140, 696	745, 197	442, 252
Montana	143, 308	92, 741	71, 983	27, 080	59, 484	55, 022	131, 467	82, 102
Idaho	117, 788	99, 248	61, 053	50, 559	47, 137	40, 637	108, 190	91, 196
Wyoming	52, 794	47, 913	12, 315	12, 906	36, 780	31, 318	49, 095	44, 224
Colorado	157, 409	155, 149	74, 577	75, 907	69, 509	67, 262	144, 086	143, 169
New Mexico	56, 758	41, 682	18, 582	12, 656	32, 277	24, 190	50, 859	36, 846
Arizona	57, 233	49, 324	29, 273	30, 091	24, 188	15, 429	53, 461	45, 520
Utah	63, 248	52, 994	23, 775	18, 653	33, 751	29, 279	57, 526	47, 932
Nevada	20, 219	13, 923	2, 815	2, 156	16, 180	10, 761	18, 995	12, 917
Washington	188, 597	170, 331	109, 844	89, 440	61, 446	64, 487	171, 291	153, 927
Oregon	131, 570	114, 261	58, 986	48, 917	59, 039	53, 123	118, 025	102, 040
California	595, 328	586, 538	405, 841	391, 630	168, 615	176, 063	574, 456	567, 693
United States	[3] 11, 699, 192	[4] 9, 401, 939	[3] 5,261,368	[4] 3,452,735	4, 659, 288	4, 423, 141	[3] 9, 920, 656	[4] 7, 875, 876

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[1] Commodities included are those shown in Table 452. Estimated quantities produced by States, times weighted annual prices, by States.
[2] Estimated quantities sold and consumed in farm households, by States, times weighted annual prices by States.
[3] Includes $3,507,000 for sugar beets in "Other States."
[4] Includes $6,047,000 for sugar beets in "Other States."
[5] Estimated quantities sold, by States, times weighted annual prices, by States; gross income equals cash income plus value of quantities consumed in farm households, times weighted annual prices.

TABLE 456.—*Farm value, gross income, and cash income from farm production, United States, average 1924–1928 and 1930*

Product	Farm value		Gross income		Cash income	
	Average, 1924–1928	1930	Average, 1924–1928	1930	Average, 1924–1928	1930
Crops:	*1,000 dolls.*	*1,000 dolls.*	*1,000 dolls.*	*1,000 dolls.*	*1,000 dolls.*	*1,000 dolls.*
Corn	2,252,421	1,258,313	397,030	182,178	370,828	160,433
Wheat	1,006,210	566,231	847,239	401,441	833,837	393,224
Oats	594,215	463,708	147,216	79,901	147,216	79,901
Barley	152,449	133,674	61,301	35,650	61,301	35,650
Rye	44,142	22,398	33,502	13,597	33,124	13,347
Buckwheat	12,591	7,470	9,564	4,900	8,680	4,107
Flaxseed	49,416	36,588	46,184	33,589	46,184	33,589
Rice	44,011	33,016	41,685	31,438	41,617	31,410
Grain sorghums	90,438	48,720	17,971	8,849	17,971	8,849
Emmer and spelt	2,486	1,527	202	117	202	117
Popcorn	1,816	2,304	1,816	2,304	1,816	2,304
Cotton lint	1,373,964	656,381	1,373,964	656,381	1,373,964	656,381
Cottonseed	206,510	134,132	152,923	91,576	152,923	91,576
Tobacco	256,201	216,895	256,201	216,895	256,201	216,895
Hay	1,283,914	1,054,388	200,795	151,394	200,795	151,394
Sweet sorghum forage	32,898	32,837	3,037	2,658	3,037	2,658
Hemp	144	114	144	114	144	114
Cloverseed (red and alsike)	17,239	17,259	14,261	14,745	14,261	14,745
Sweetclover seed	5,496	2,323	3,971	1,653	3,971	1,653
Lespedeza seed	737	267	483	150	483	150
Alfalfa seed	9,438	9,745	8,444	9,133	8,444	9,133
Timothy seed	6,059	3,798	5,702	3,493	5,702	3,493
Dry edible beans	53,109	53,029	48,048	50,025	47,646	49,690
Soybeans	25,381	34,024	6,997	11,622	6,997	11,622
Cowpeas	32,733	21,086	4,271	3,132	2,991	2,320
Peanuts	61,238	41,818	37,393	21,997	36,076	21,350
Velvetbeans	12,933	14,532				
Broomcorn	5,086	3,263	5,086	3,263	5,086	3,263
Potatoes, white	413,905	348,362	337,900	287,562	267,441	220,486
Sweetpotatoes	94,937	71,008	92,734	59,101	69,531	40,270
Truck crops	313,873	336,117	313,873	336,117	292,205	313,848
Hops	6,066	3,462	6,066	3,462	6,066	3,462
Apples	202,086	167,845	194,283	162,257	156,181	130,234
Peaches	62,966	43,653	60,462	40,716	46,549	32,203
Pears	25,423	19,932	24,617	19,221	20,244	16,447
Cherries	8,075	13,940	8,075	13,940	7,436	12,814
Plums and apricots	10,927	6,279	10,666	6,092	6,943	3,264
Grapes	63,219	43,378	62,280	42,803	58,497	39,968
Other fruits and nuts	195,842	201,398	195,795	201,346	194,531	200,190
Strawberries	55,397	47,108	55,397	47,108	54,816	46,475
Small fruits	24,393	20,833	24,393	20,833	24,032	20,434
Cranberries	6,313	5,789	6,313	5,789	6,313	5,789
Pecans	8,955	5,939	8,955	5,939	7,714	4,995
Sugar beets, for sugar	54,374	65,704	54,374	65,704	54,374	65,704
Sugarcane and sirup	26,969	21,507	18,210	16,358	12,082	11,741
Sorghum sirup	25,382	19,921	18,256	13,376	7,812	5,347
Maple sugar and sirup	8,681	9,607	8,681	9,607	7,578	8,721
Forest products	314,472	299,727	314,472	299,727	182,257	173,704
Farm gardens	290,136	245,402	290,136	245,402		
Nursery products	20,432	20,432	20,432	20,432	20,432	20,432
Greenhouse products	76,839	76,839	76,839	76,839	76,839	76,839
Total	9,942,938	6,964,022	5,928,638	4,031,926	5,261,368	3,452,735
Livestock and livestock products:						
Cattle and calves	928,688	990,023	1,003,674	937,023	974,331	905,399
Hogs	1,508,342	1,354,030	1,546,016	1,376,097	1,252,107	1,126,900
Sheep and lambs	175,224	144,342	153,162	142,173	150,026	139,111
Horses	41,931	35,075	14,802	9,242	14,802	9,242
Mules	20,062	15,433	11,422	7,150	11,422	7,150
Chickens	428,808	387,600	430,060	394,880	255,497	244,012
Eggs (chicken)	698,037	652,962	669,080	626,932	511,104	490,619
Milk	1,919,604	1,853,756	1,829,175	1,795,699	1,380,188	1,422,212
Wool	94,032	65,642	94,032	65,642	94,032	65,642
Mohair	7,457	5,287	7,457	5,287	7,457	5,287
Honey	11,367	9,670	11,367	9,670	8,013	7,349
Beeswax	307	218	307	218	307	218
Total	5,833,858	5,514,038	5,770,554	5,370,013	4,659,288	4,423,141
Grand total			11,699,192	9,401,939	9,920,656	7,875,876

Bureau of Agricultural Economics. Estimated quantities produced, sold, and consumed in farm households times weighted annual prices. Cash income plus value of commodities consumed in farm households equals gross incomes. For feed and seed crops, horses, and mules, value includes sales by farmers in some States eventually bought by farmers in other States. These interfarm s sales tend to overestimate the total income from farm production for the country as a whole.

TABLE 457.—*Gross income from farm production by groups of commodities, expenditures, income available for operators' capital, labor, and management and current value of capital employed in agriculture, United States, 1924–1930*

Item	1924	1925	1926	1927	1928	1929	1930
	Million dollars	*Million dollars*	*Million dollars*	*Million dollars*	*Million dollars*	*Million dollars*	*Million dollars*
Crops:							
Grains	1,755	1,496	1,432	1,592	1,513	1,281	760
Fruits and nuts	671	683	694	690	705	722	586
Vegetables	953	1,193	1,093	1,062	967	1,180	963
Sugar crops	104	95	103	104	92	97	105
Cotton and cottonseed	1,710	1,740	1,251	1,464	1,470	1,389	748
Tobacco	259	251	237	257	278	283	217
Other crops	719	689	659	649	650	657	592
Total crops	6,170	6,147	5,468	5,817	5,675	5,609	3,971
Livestock and livestock products:							
Cattle, hogs, and sheep	2,380	2,822	2,922	2,664	2,727	2,817	2,455
Poultry and eggs	989	1,114	1,167	1,108	1,202	1,254	1,037
Dairy products	1,678	1,759	1,805	1,911	1,994	2,109	1,796
Wool	87	97	88	86	111	94	66
Other	33	28	30	30	32	28	22
Total livestock	5,167	5,820	6,012	5,799	6,066	6,302	5,376
Total crops and livestock	11,337	11,968	11,480	11,616	11,741	11,911	9,347
Operators' expenditures:							
Operating costs [1]	2,541	2,888	2,727	2,740	2,968	2,977	2,724
Wages to hired labor [2]	1,206	1,219	1,241	1,234	1,228	1,231	1,011
Taxes [3]	458	459	465	475	482	490	490
Interest [4]	712	705	699	690	684	681	671
Rent [5]	927	958	809	911	916	953	701
Total deductions	5,844	6,229	5,941	6,050	6,278	6,332	5,597
Balance available for capital, labor, and management:							
Total	5,493	5,739	5,539	5,566	5,463	5,579	3,750
Per farm, in dollars [6]	862	903	874	880	866	887	598
Capital:							
Total [7]	57,718	57,861	56,754	57,256	58,141	58,130	52,747
Total operators' capital used in production [8]	27,421	27,633	26,886	27,410	28,183	28,177	24,132
Income available for operators' capital and management [9]	1,088	1,292	1,005	1,065	972	1,060	−346
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Income available for operators' capital and management as per cent of operators' capital	4.0	4.7	3.7	3.9	3.4	3.8	−1.4

Bureau of Agricultural Economics.

[1] All of the operating costs indicated in Table 4, Crops and Markets, September, 1931, p. 398, except 7.5 per cent of total fertilizer costs, 9.5 per cent of feed, 10 per cent of binder twine, 15 per cent of ginning costs, and 20 per cent of repairs on buildings and insurance. These deductions are estimated as paid by nonfarmer landlords.
[2] Estimates of cash wages and board, and 10 per cent allowance for perquisites and hired domestic labor contributing to production.
[3] 70 per cent of estimated total taxes on all farm real estate paid by operators, less 10 per cent to allow for taxes on farm dwellings.
[4] Paid on all bank loans and on 90 per cent of total farm mortgage debt held by nonfarmers, 10 per cent of the total mortgage debt being assigned to farm dwellings.
[5] Paid on 72 per cent of all rented farms to nonoperators.
[6] Estimated number of farms interpolated between 6,372,000 on Jan. 1, 1925, and 6,289,000 on Apr. 1, 1930.
[7] As of Dec. 31, includes land, buildings, machinery, livestock, and 1 per cent cash working capital.
[8] All capital used in production excluding value of farm indebtedness to nonfarmers and value of farms rented from nonfarmers. This total includes value of autos used for pleasure which probably offsets value of dwellings used for production.
[9] Income available for all capital, labor, and management, less wage allowance for labor of operators and families. Operators are here allowed an annual hired-hand wage without board, and family labor is taken as 22 per cent additional to the operators' labor. The value of the operator's labor is here understated in so far as hired hands receive proquisites in addition to cash and board, and it may be overstated in so far as the operator's time is not entirely spent on farm work.

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TABLE 458.—*Current value of agricultural capital, gross income from farm production, and selected expenditures, United States, 1909–1931*

Calendar year	Current value of agricultural capital [1]	Gross income [2]	Selected expenditures: Wages (including board) [3]	Feed [4]	Fertilizer [5]	Farm implements (excluding autos and trucks) [6]	Other farm machinery and their costs of operation [7]	Ginning [8]	Taxes [9]	Interest on mortgages [10]
	Million dollars	*Million dollars*	*Million dollars*	*Million dollars*	*Million dollars*	*Million dollars*	*Million dollars*	*Million dollars*	*Million dollars*	*Million dollars*
1909	41,354	6,238	652	300	115	192		33	262	199
1910	42,985	6,643	674	302	137	219		39	268	210
1911	44,086	6,372	673	372	152	217		52	275	221
1912	46,081	6,784	697	336	153	244		45	278	232
1913	47,778	6,975	721	453	172	265		46	286	240
1914	47,965	7,028	696	431	188	285		56	292	252
1915	50,533	7,395	701	471	158	296		43	298	269
1916	55,041	8,914	766	638	163	357		50	304	299
1917	61,576	12,832	941	871	217	513		54	310	345
1918	67,055	15,101	1,162	1,023	297	605		64	345	401
1919	79,099	16,935	1,356	1,097	326	693		77	380	469
1920	71,791	13,566	1,557	726	359	594		91	452	545
1921	63,091	8,927	997	484	217	239		47	633	554
1922	61,454	9,944	971	598	210	281		59	678	568
1923	58,997	11,040	1,098	670	229	393		61	718	564
1924	57,718	11,337	1,074	750	231	350	755	82	727	567
1925	57,861	11,968	1,137	828	255	429	915	100	729	568
1926	56,754	11,480	1,151	734	253	460	741	121	738	568
1927	57,256	11,616	1,148	789	234	494	874	73	754	568
1928	58,141	11,741	1,147	897	273	508	918	88	766	563
1929	58,130	11,911	1,195	919	271	578	885	89	777	554
1930	52,747	9,347	1,036	805	268	480	815	78	777	540
1931 [11]		6,920	805	590						

Bureau of Agricultural Economics. Tentative estimates of the bureau.

[1] As of end of year. Includes land, buildings, machinery, livestock, and working capital (estimated at 1 per cent of other items). Interpolation between census estimates: Land and buildings based on index of land values per acre and straight line interpolation of total acreage in farms; livestock, annual estimates of United States Department of Agriculture; machinery, interpolated on basis of estimated values of land and buildings, 1909–1919, straight line interpolations, 1920–1924 and 1925–1930.

[2] 1924–1930, Table 457; 1909–1923 based on items which represent 95 per cent of gross income in 1924–1930.

[3] Interpolations between census estimates, based on United States Department of Agriculture index of farm wages.

[4] Interpolation between census years based on an index of prices paid by farmers for feed and an index of production of feed crops. The product of the two indexes was adjusted to equal the census values of feed purchased.

[5] Interpolated between census estimates, based on index of value derived from total fertilizer consumption and United States Department of Agriculture index of fertilizer prices paid by farmers.

[6] 1909–1919: 1909, 1914, and 1919 census values of farm implements produced adjusted to represent total farm equipment sold in the United States at farm values. Interpolations for other years to 1920 based on gross income from farm production. 1920–1930 estimates based largely on factory value of farm implements sold in the United States raised to represent farm values.

[7] Includes estimated costs of operating automobiles, trucks, and tractors; 90 per cent of annual farm purchases of autos and trucks, and harness and saddlery.

[8] Annual cotton production, multiplied by ginning costs per bale.

[9] 1924–1930, estimates based on annual survey of tax rates per acre. 1914–1923, based on index of taxes as published, and estimate for 1924. 1909–1913, based on average of indexes of taxes for three States, New York, Ohio, and Kansas.

[10] Interpolations between total farm mortgages for 1910, 1920, 1925, 1928, 1930, using smoothed estimates for 1911–1919 derived from value of current agricultural capital, and smooth curve, 1920–1930.

[11] Preliminary.

TABLE 459.—*Farm returns, 1922–1930*

[Average of reports of owner-operators for their own farms for calendar year]

Item	United States									North Atlantic		East North Central		West North Central		South Atlantic		South Central		Western	
	1922	1923	1924	1925	1926	1927	1928	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930
Number of reports	6,094	16,183	15,103	15,330	13,475	13,859	11,851	11,805	6,228	1,255	703	2,331	1,355	2,594	1,477	1,499	643	2,719	1,361	1,407	689
Size of farm ... acres	252	298	303	304	315	275	284	270	284	139	137	146	148	350	360	184	198	255	246	563	693
Value of farm real estate, Jan. 1	$13,586	$14,530	$14,323	$14,157	$13,379	$12,543	$12,299	$12,090	$12,009	$8,566	$8,286	$11,693	$11,789	$17,950	$17,152	$7,895	$8,152	$8,643	$8,346	$16,219	$16,050
Value of farm personalty, Jan. 1	2,844	2,960	2,937	2,965	2,929	2,893	3,118	3,152	3,156	3,459	3,513	2,997	2,988	4,538	4,387	1,658	1,788	1,918	1,780	4,559	4,484
Receipts:																					
Crop sales	816	850	1,012	993	926	978	946	1,029	779	831	848	557	454	818	687	1,119	778	1,143	794	2,063	1,520
Sales of livestock	660	760	780	897	894	851	936	922	765	471	431	909	774	1,806	1,520	389	322	490	289	1,116	818
Sales of livestock products	454	550	570	585	589	638	689	681	635	1,623	1,607	920	830	598	452	356	352	255	233	766	713
Miscellaneous other	42	80	72	76	39	38	37	37	32	65	72	40	31	35	28	30	26	21	18	51	30
Total	1,972	2,240	2,434	2,551	2,448	2,505	2,608	2,669	2,211	2,990	2,958	2,426	2,089	3,257	2,687	1,894	1,478	1,909	1,334	3,996	3,081
Cash outlay:																					
Hired labor	331	350	384	386	386	397	394	399	378	444	494	250	265	350	323	416	368	359	333	758	699
Livestock bought	204	240	222	242	242	238	238	238	172	202	126	205	145	389	336	156	98	155	76	294	175
Feed bought	175	210	248	244	232	243	262	276	276	612	639	275	251	302	296	149	163	146	132	317	302
Fertilizer	57	60	66	69	73	64	67	79	78	124	131	63	58	13	13	230	231	74	90	36	35
Seed	43	40	44	47	48	49	46	43	43	63	64	46	44	50	48	33	33	28	30	46	47
Taxes on farm property	174	190	192	191	183	180	184	187	196	165	167	217	228	240	252	115	117	118	121	267	268
Machinery and tools	123	110	103	119	130	129	151	159	118	135	145	137	91	257	199	68	55	98	56	248	150
Miscellaneous other	150	150	151	179	179	157	176	191	191	182	210	181	163	233	224	108	89	103	111	397	407
Total	1,257	1,350	1,410	1,477	1,473	1,457	1,518	1,572	1,452	1,927	1,976	1,374	1,245	1,834	1,691	1,275	1,154	1,081	949	2,363	2,083
Receipts less cash outlay	715	890	1,024	1,074	975	1,048	1,090	1,097	759	1,063	982	1,052	844	1,423	996	619	324	828	385	1,633	998
Increase in inventory of personal property	202	130	181	223	158	242	244	201	−221	191	−100	126	−240	261	−401	145	−110	159	−168	361	−130
Net result	917	1,020	1,205	1,297	1,133	1,290	1,334	1,298	538	1,254	882	1,178	604	1,684	595	764	214	987	217	1,994	868
Interest paid	[1]	230	230	225	215	201	202	199	199	105	106	173	170	339	320	95	99	125	137	323	307
Spent for farm improvements	[1]	140	133	131	128	141	126	125	92	130	117	127	96	152	99	84	81	96	59	164	117
Value of food produced and used on the farm [2]	294	265	266	274	282	273	269	262	242	267	257	269	246	282	249	286	266	242	220	227	219

Value of family labor, including owner [2]	716	870	789	793	779	763	768	772	716	914	835	845	767	918	844	492	472	505	464	1,024	914
Change in value of real estate during the year (minus sign (−) shows decrease)	−52	−66	+145	+173	+2	+61	+72	+27	−757	+40	−158	−20	−697	+5	−1,216	−11	−526	+50	−647	+127	−938

Bureau of Agricultural Economics. Compiled from reports of individual farms operated by their owners. Division averages for 1922 in Agriculture Yearbook, 1924, pp. 1131–1132; for 1923–24 in Agriculture Yearbook; 1925, pp. 1342–1343; for 1925 in Yearbook of Agriculture, 1927, pp. 1132–1133; for 1926 in Yearbook of Agriculture, 1928, pp. 1038–1039; for 1927 in Yearbook of Agriculture, 1930, pp. 972–973; for 1928–29 in Yearbook of Agriculture 1931, pp. 982–983.

[1] Not reported for 1922.

[2] Averages of farms for which the item was reported.

TABLE 460.—*Farm returns: Proportion of farmers obtaining net results within specified ranges, 1922–1930*

Item	United States									North Atlantic		East North Central		West North Central		South Atlantic		South Central		Western	
	1922	1923	1924	1925	1926	1927	1928	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930
Number of reports	6,094	16,183	15,103	15,330	13,475	13,859	11,851	11,805	6,228	1,255	703	2,331	1,355	2,594	1,477	1,499	643	2,719	1,361	1,407	689
Size of farm ... acres	252	298	303	304	315	275	284	270	284	139	137	146	148	350	360	184	198	255	246	563	693
Value of farm property Jan. 1 per farm ... dollars	16,430	17,490	17,260	17,122	16,308	15,436	15,417	15,242	15,165	12,025	11,799	14,690	14,777	22,488	21,539	9,553	9,940	10,561	10,126	20,778	20,534
Net result per farm ... do	917	1,020	1,205	1,297	1,133	1,290	1,334	1,298	538	1,254	882	1,178	604	1,684	595	764	214	987	217	1,994	868
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Proportion obtaining:																					
$5,000 or more	1.77	1.88	2.69	3.00	2.29	3.19	3.12	2.94	1.03	2.31	1.56	1.54	.74	4.51	1.01	1.27	.78	1.62	.51	7.25	2.32
$3,000 to $4,999	3.89	4.67	6.10	6.82	5.49	6.42	6.77	6.24	2.37	6.14	3.98	4.85	1.92	10.99	3.18	2.40	.93	3.05	1.03	10.09	3.92
$2,500 to $2,999	2.51	2.88	3.61	4.03	3.59	3.86	4.06	4.25	1.96	4.54	2.70	4.12	1.18	6.48	2.98	2.07	.78	2.57	.96	5.68	3.63
$2,000 to $2,499	4.33	5.13	5.99	6.26	5.46	6.53	6.35	6.01	3.20	6.61	4.84	5.92	3.32	8.87	4.40	3.20	1.87	4.01	1.03	7.18	4.21
$1,500 to $1,999	7.78	8.91	9.30	9.92	9.05	9.58	10.35	10.35	5.38	12.91	7.26	13.04	6.42	12.53	6.84	5.94	2.33	6.47	1.47	11.80	8.85
$1,000 to $1,499	14.39	14.49	15.13	15.44	14.09	15.46	15.23	14.89	9.41	14.74	15.65	16.82	11.22	16.69	9.75	11.00	4.51	13.61	4.56	15.07	12.92
$500 to $999	22.82	23.07	21.86	21.79	22.10	22.07	22.07	22.63	17.23	20.40	19.49	24.07	21.33	18.89	17.74	23.42	14.15	27.33	12.78	19.19	17.42
$0 to $499	27.98	26.09	24.68	22.32	26.43	23.98	23.19	24.76	29.93	23.83	27.03	22.61	31.58	14.80	24.85	37.89	36.08	33.65	34.68	16.35	25.40
$0 to −$499	9.89	9.10	7.85	7.81	8.56	6.68	7.20	6.37	19.76	7.41	13.37	6.22	16.16	4.20	15.44	10.94	26.13	6.58	33.06	4.55	10.45
−$500 to −$999	2.36	2.07	1.57	1.54	1.69	1.28	1.04	1.01	5.54	.71	2.42	.64	3.69	1.54	7.04	.80	7.93	.63	6.76	1.85	4.50
−$1,000 or more	2.28	1.71	1.22	1.07	1.25	.95	.62	.55	4.19	.40	1.70	.17	2.44	.50	6.77	1.07	4.51	.48	3.16	.99	6.38
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Bureau of Agricultural Economics. The reports are those tabulated in Table 459 (preceding). For distribution by geographical divisions, see Table 476, Yearbook, 1927; Table 509, Yearbook, 1928; Table 511, Yearbook, 1930, and Table 459, Yearbook, 1931.

TABLE 461.—*Wheat: Cost of production by yield groups and geographical divisions, 1930*

Yield group (bushels per acre) and geographical division	Reports	Average acreage in wheat per farm	Average yield per acre	Gross cost per acre								Credit per acre (straw)	Net cost	
				Prepare and plant	Harvest and thresh	Market	Fertilizer and manure	Seed	Land rent	Miscellaneous [1]	Total		Per acre	Per bushel
Winter-wheat belt: [2]	*Number*	*Acres*	*Bushels*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
12 and under	213	105	9	2.75	2.63	0.56	0.91	1.15	3.27	1.88	13.15	0.52	12.63	1.40
13 to 18	139	149	15	2.96	3.17	.77	.87	1.11	4.33	2.07	15.28	.37	14.91	.99
19 to 24	109	84	20	2.98	3.78	.91	.85	1.16	5.05	1.87	16.60	.67	15.93	.80
25 and over	57	105	29	3.17	4.51	1.07	.74	1.23	6.86	2.21	19.79	.43	19.36	.67
Total or average	518	112	15	2.91	3.23	.75	.87	1.15	4.31	2.00	15.22	.50	14.72	.98
Spring-wheat belt: [3]														
12 and under	148	159	9	2.89	2.45	.57	.42	1.23	2.47	2.01	12.04	.20	11.84	1.32
13 to 18	85	126	16	3.02	2.93	.73	.23	1.43	3.28	2.14	13.76	.18	13.58	.85
19 and over	40	72	23	3.21	3.88	.94	.80	1.68	4.84	2.48	17.83	.32	17.51	.76
Total or average	273	136	13	2.98	2.81	.68	.42	1.36	3.10	2.13	13.48	.21	13.27	1.02
Geogrpahical division:														
North Atlantic	204	15	23	5.91	5.48	1.42	6.26	2.36	6.10	3.48	31.01	4.97	26.04	1.13
East North Central	502	24	20	3.84	3.99	.96	3.25	1.83	5.28	2.52	21.67	1.77	19.90	1.00
West North Central	821	104	16	2.95	3.17	.78	.77	1.29	4.17	2.04	15.17	.45	14.72	.92
South Atlantic	333	16	17	4.23	4.44	1.38	4.26	1.82	5.27	2.67	24.07	2.62	21.45	1.26
South Central	131	107	12	2.84	3.30	.87	.80	1.17	4.47	1.99	15.44	.68	14.76	1.23
Western	343	179	22	4.13	3.85	1.09	.66	1.42	9.09	3.45	23.69	.66	23.03	1.05
United States	2,334	77	18	3.75	3.82	1.00	2.27	1.59	6.14	2.56	21.13	1.48	19.65	1.09

Bureau of Agricultural Economics. From returns to mail inquiry sent to crop reporters. For figures by yield groups for 7 years, 1923–1929, see Agriculture Yearbooks, 1924, p. 1133; 1925, p. 1328; 1926, p. 1210; 1927, p. 1136; 1928, p. 1041; 1930, p. 984; and 1931, p.1013. For figures by geographical divisions for 7 years, 1923–1929 see June issues of Monthly Supplement, Crops and Markets, 1924, p. 176; 1925, p. 180; 1926, p. 170; Crops and Markets, June issues, 1927, p. 202; 1928, p. 196; 1929, p. 202; 1930, p. 220.

[1] Includes miscellaneous labor, irrigation (including water), seed treatment, sacks and twine, crop insurance, use of implements, use of storage buildings, and overhead.
[2] Winter-wheat belt as used here includes Kansas, Nebraska, Missouri, and Oklahoma.
[3] Spring-wheat belt as used here includes western Minnesota, North Dakota, eastern South Dakota, and eastern Montana.

TABLE 462.—*Corn: Cost of production by yield groups and geographical divisions, 1930*

Yield group (bushels per acre) and geographic division	Reports	Average acreage in corn per farm	Average yield per acre	Gross cost per acre: Prepare and plant	Cultivate	Harvest	Market	Fertilizer and manure	Seed	Land rent	Miscellaneous [1]	Total	Credit per acre (stover and fodder)	Net cost: Per acre	Per bushel
	Number	*Acres*	*Bushels*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
All reports:															
7 and under	518	31	3	3.73	2.96	1.57	0.40	2.62	0.46	4.16	1.90	17.80	1.42	16.38	5.46
8 to 17	974	38	12	3.65	2.83	2.16	.94	2.70	.42	4.34	1.89	18.93	1.85	17.08	1.42
18 to 27	879	38	22	3.98	2.84	2.63	1.43	3.15	.45	5.19	2.21	21.88	2.00	19.88	.90
28 to 37	592	48	32	3.96	2.81	3.25	1.67	3.31	.45	5.98	2.22	23.65	1.86	21.79	.68
38 to 47	383	47	41	4.37	2.82	3.55	1.91	4.30	.55	6.75	2.39	26.64	1.95	24.69	.60
48 to 57	176	36	51	4.95	3.33	4.58	2.45	5.44	.60	7.41	2.84	31.60	2.81	28.79	.56
58 and over	94	33	66	5.44	3.47	5.10	3.50	7.52	.63	8.43	3.66	37.75	3.33	34.42	.52
Corn Belt: [2]															
17 and under	272	42	10	3.20	2.43	1.97	.76	1.87	.37	4.29	1.59	16.48	1.20	15.28	1.53
18 to 27	219	59	22	3.52	2.13	2.02	1.18	1.79	.37	5.67	1.70	18.38	1.06	17.32	.79
28 to 37	238	65	32	3.59	2.32	2.76	1.40	2.04	.43	6.66	2.00	21.20	.90	20.30	.63
38 to 47	178	70	41	3.90	2.33	2.79	1.48	2.36	.50	7.52	2.08	22.96	.99	21.97	.54
48 to 57	79	57	51	4.04	2.57	3.53	1.96	2.91	.56	7.84	2.83	26.24	1.61	24.63	.48
58 and over	32	47	65	4.34	2.68	4.25	2.47	4.46	.55	8.23	2.13	29.11	1.40	27.71	.43
Total or average	1,018	57	28	3.58	2.34	2.51	1.29	2.14	.43	6.12	1.92	20.33	1.10	19.23	.69
Geographic division:															
North Atlantic [3]	218	12	29	6.71	3.88	6.14	1.98	9.67	.72	6.40	3.42	38.92	5.10	33.82	1.17
East North Central	752	36	31	4.54	2.83	3.52	1.58	4.20	.52	5.50	2.39	25.08	2.26	22.82	.74
West North Central	1,131	62	23	3.09	2.14	2.17	1.15	1.60	.42	5.01	1.78	17.36	.96	16.40	.71
South Atlantic	632	21	20	4.59	3.52	2.89	1.47	5.07	.46	5.43	2.31	25.74	3.26	22.48	1.12
South Central	803	33	14	3.46	3.25	1.61	1.20	2.01	.42	5.10	2.01	19.06	1.04	18.02	1.29
Western	80	33	30	4.24	2.79	3.06	1.96	1.54	.49	6.65	3.14	23.87	2.04	21.83	.73
United States	3,616	39	23	4.03	2.91	2.78	1.37	3.41	.47	5.31	2.19	22.47	1.96	20.51	.89

Bureau of Agricultural Economics. From returns to mail inquiry sent to crop reporters. For figures by yield groups for 7 years 1923–1929, see Agriculture Yearbooks, 1924, p. 1135; 1925, p. 1332; 1926, p. 1213; 1927, p. 1139; 1928, p. 1044; 1930, p. 985, and 1931, p. 1014. For figures by geographical divisions for 7 years, 1923–1929, see June issues of Monthly Supplement, Crops and Markets, 1924, p. 176; 1925, p. 180; 1926, p. 170; Crops and Markets, June issues, 1927, p. 202; 1928, p. 196; 1929, p. 202; and 1930, p. 220.

[1] Includes miscellaneous labor, irrigation (including water), seed treatment, sacks and twine, crop insurance, use of implements, use of storage buildings, and overhead.

[2] Corn Belt as used here includes Indiana, Illinois, Iowa, western Ohio, southeast corner of South Dakota, eastern Nebraska, northeast corner of Kansas, and the northern three-fourths of Missouri.

[3] Does not include reports from Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

TABLE 463.—*Oats: Cost of production by yield groups and geographical divisions, 1930*

Yield group (bushels per acre) and geographic division	Reports	Average acreage in oats per farm	Average yield per acre	Gross cost per acre								Credit per acre (straw)	Net cost	
				Prepare and plant	Harvest and thresh	Market	Fertilizer and manure	Seed	Land rent	Miscellaneous [1]	Total		Per acre	Per bushel
	Number	*Acres*	*Bushels*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
17 and under	312	22	10	2.91	2.50	0.55	1.32	1.22	3.58	1.88	13.96	0.87	13.09	1.31
18 to 22	273	22	20	2.90	3.21	.85	1.22	1.30	4.23	1.90	15.61	1.12	14.49	.72
23 to 27	249	22	25	3.08	3.48	1.00	1.34	1.31	4.21	2.07	16.49	1.93	14.56	.58
28 to 32	412	28	30	3.03	3.71	1.04	1.22	1.28	4.64	2.18	17.10	1.35	15.75	.52
33 to 37	239	28	35	3.25	3.97	1.09	1.18	1.34	4.88	2.22	17.93	1.38	16.55	.47
38 to 42	388	27	40	3.45	4.42	1.31	1.46	1.44	5.77	2.71	20.56	1.67	18.89	.47
43 to 47	156	24	45	3.59	4.53	1.35	1.47	1.47	5.78	2.59	20.78	2.03	18.75	.42
48 to 52	266	29	50	3.60	4.74	1.50	1.68	1.39	6.30	2.77	21.98	2.13	19.85	.40
53 to 57	63	25	55	3.72	5.43	1.88	2.41	1.65	5.74	2.76	23.59	3.05	20.54	.37
58 to 62	103	24	60	3.66	5.39	1.81	1.35	1.41	6.83	2.97	23.42	2.13	21.29	.35
63 and over	65	19	74	4.18	5.56	2.06	1.28	1.78	8.55	3.65	27.06	2.47	24.59	.33
Geographic division:														
North Atlantic	264	13	41	5.81	5.78	1.63	3.50	2.03	5.65	3.22	27.62	4.13	23.49	.57
East North Central	621	24	37	3.19	3.83	1.12	1.40	1.21	5.37	2.54	18.66	1.86	16.80	.45
West North Central	983	34	33	2.34	3.38	1.00	.44	1.14	4.65	2.00	14.95	.83	14.12	.43
South Atlantic	304	10	26	3.88	4.25	1.28	3.07	1.76	4.90	2.27	21.41	2.02	19.39	.75
South Central	181	22	27	2.73	3.72	1.24	1.05	1.43	4.62	1.90	16.69	.92	15.77	.58
Western	173	29	39	4.29	4.58	1.25	.76	1.34	6.86	3.26	22.34	1.15	21.19	.54
United States	2,526	25	34	3.26	3.95	1.15	1.38	1.36	5.11	2.37	18.58	1.60	16.98	.50

Bureau of Agricultural Economics. From returns to mail inquiry sent to crop reporters. For figures by yield groups for 7 years, 1923–1929, see Agriculture Yearbooks, 1924, p. 1137; 1925, p. 1335; 1926, p. 1217; 1927, p. 1143; 1928, p. 1048; 1930, p. 986, and 1931, p. 1015. For figures by geographical divisions for 7 years, 1923–1929, see June issues of Monthly Supplement, Crops and Markets, 1924, p. 176; 1925, p. 180; 1926, p. 170; Crops and Markets, June issues, 1927, p. 202; 1928, p. 196; 1929, p. 202; 1930, p. 220.

[1] Includes miscellaneous labor, irrigation (including water), seed treatment, sacks and twine, crop insurance, use of implements, use of storage buildings, and overhead.

TABLE 464.—*Cotton: Cost of production by yield groups, 1930*

Yield group (pounds of lint per acre)	Reports	Average acreage in cotton per farm	Average yield of lint per acre	Gross cost per acre									Credit per acre (cottonseed)	Net cost of lint	
				Prepare and plant	Cultivate	Harvest and market	Fertilizer and manure	Seed	Ginning	Land rent	Miscellaneous [1]	Total		Per acre	Per pound
	Number	*Acres*	*Pounds*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
100 and under	213	58	71	3.73	4.61	3.19	2.88	1.05	0.97	4.06	2.21	22.70	1.71	20.99	0.30
101 to 180	285	63	145	3.50	4.97	4.42	3.81	1.06	1.56	4.79	2.55	26.66	2.94	23.72	.16
181 to 260	262	43	226	4.03	5.74	5.89	6.24	1.12	2.02	5.18	3.63	33.90	4.61	29.29	.13
261 to 340	111	72	300	4.30	5.57	7.46	7.62	1.19	2.70	5.82	3.95	38.61	5.74	32.87	.11
341 to 420	85	33	376	4.55	5.89	8.76	8.30	1.24	3.30	7.08	4.77	43.89	6.84	37.05	.10
421 and over	72	76	542	4.92	6.46	13.63	6.41	1.18	5.91	10.76	7.89	57.16	11.82	45.34	.08

Bureau of Agricultural Economics. From returns to mail inquiry sent to crop reporters in all cotton States.

[1] Includes miscellaneous labor, irrigation (including water), dusting, picking sacks and sheets, crop insurance, use of implements, use of storage buildings, and overhead.

TABLE 465.—*Cotton: Cost of production by yield groups, 1925–1930*

Yield group (pounds of lint per acre) [1]	Farms reporting						Average yield of lint per acre						Net cost of lint per pound [2]					
	1925	1926	1927	1928	1929	1930	1925	1926	1927	1928	1929	1930	1925	1926	1927	1928	1929	1930
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
100 and under	126	123	117	136	204	213	68	76	68	80	71	71	39	29	32	28	29	30
101 to 180	319	280	225	311	273	285	149	148	149	147	147	145	19	17	17	17	16	16
181 to 260	464	330	314	362	219	262	228	228	229	227	223	226	14	13	13	13	14	13
261 to 340	212	154	134	157	101	111	301	303	299	299	299	300	12	12	12	12	12	11
341 to 420	149	102	106	90	81	85	381	382	381	381	380	376	11	11	10	10	11	10
421 and over	135	81	96	63	51	72	506	505	509	512	511	542	9	9	9	8	9	8

Bureau of Agricultural Economics. From returns to mail inquiry sent to crop reporters in all cotton States.

[1] The average yield of lint cotton in the United States, as estimated by the crop-reporting board, has been as follows: 1925, 167.2 pounds; 1926, 182.6 pounds; 1927, 154.5 pounds; 1928, 152.9 pounds; 1929, 155 pounds; 1930, 147.7 pounds.

[2] The average costs per pound for the yield groups which closely approximated the average yields for the United States as estimated by the crop-reporting board are as follows: 1925, 18 cents; 1926, 15.5 cents; 1927, 17 cents; 1928, 17 cents, 1929, 16 cents; 1930, 16 cents. At least a part of the yearly variations in costs in some of the upper and lower yield groups may be due to the small number of reports, and to the relative number of reports received each year from various sections of the Cotton Belt.

TABLE 466.—*Index numbers of prices paid by farmers, 1910–1930*

[Base 1910–1914=100]

Year or date	Commodities used in production: Feed	Commodities used in production: Machinery	Commodities used in production: Fertilizer	Commodities used in production: Building materials for other than house	Commodities used in production: Equipment and supplies	Commodities used in production: Seed [1]	Commodities used in production: All commodities bought for use in production	Wage rates paid to hired labor	Commodities bought for use in production plus wages paid to hired labor	Commodities bought for family maintenance [2]	All commodities bought for use in production and family maintenance	Taxes on farm property [3]
	Index no.	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*
1910	92	101	97	100	101	------	98	97	98	98	98	------
1911	108	103	97	102	100	------	103	97	102	100	101	------
1912	90	100	102	103	100	105	98	101	99	101	100	------
1913	108	98	104	101	100	94	102	104	102	99	100	------
1914	103	98	101	93	99	101	99	101	100	102	101	100
1915	98	101	113	102	106	117	103	102	103	107	106	102
1916	129	111	122	118	129	112	121	112	119	125	123	104
1917	186	132	139	137	156	141	152	140	149	148	150	106
1918	196	160	173	161	180	188	176	176	176	180	178	118
1919	208	178	185	189	179	264	192	206	196	214	205	130
1920	133	188	189	205	188	149	175	239	189	227	206	155
1921	91	175	159	156	151	125	142	150	144	165	156	217
1922	118	156	131	159	139	133	140	146	142	160	152	232
1923	128	151	128	160	138	142	142	166	147	161	153	246
1924	135	155	122	159	131	148	143	166	148	162	154	249
1925	145	158	131	163	136	170	149	168	154	165	159	250
1926	120	156	129	163	142	190	144	171	150	164	156	253
1927	124	157	123	164	134	192	144	170	150	161	154	258
1928	133	158	133	161	131	179	146	169	151	162	156	263
1929	131	162	132	162	129	190	146	170	152	160	155	267
1930	119	159	128	158	124	169	140	152	142	151	146	266

Bureau of Agricultural Economics. Compiled from prices reported to the Department of Agriculture by retail dealers throughout the United States. The index numbers include only commodities bought by farmers; the commodities being weighted according to purchases reported by actual farmers in farm management and rural-life studies from 1920 to 1925.

[1] 1912–1914=100.
[2] Includes food, clothing, household operating expenses, furniture and furnishing, and building materia for house.
[3] 1914=100.

TABLE 467.—*Index numbers of farm prices, 1910–1930: By groups, crop-year averages*

[August, 1909–July, 1914=100]

Year beginning July	Grains	Fruits and vegetables	Meat animals	Dairy products	Poultry products	Cotton and cottonseed	All groups
	Index no.	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*
1910	95	96	94	98	95	114	98
1911	107	120	88	101	98	84	97
1912	93	87	104	101	97	93	97
1913	98	105	111	101	106	99	103
1914	120	85	108	99	104	69	101
1915	109	98	110	98	104	94	104
1916	172	186	143	112	138	148	146
1917	229	162	192	139	169	229	192
1918	226	170	210	162	194	234	203
1919	246	252	190	185	217	286	220
1920	164	163	140	170	191	140	152
1921	102	175	107	137	150	129	119
1922	111	129	110	141	142	194	130
1923	112	131	104	144	141	224	132
1924	155	134	125	131	158	188	142
1925	140	200	144	139	157	151	143
1926	124	153	142	137	148	106	129
1927	136	160	141	138	146	154	138
1928	119	119	158	141	154	150	137
1929	117	169	150	133	152	130	133
1930	82	125	112	109	105	79	97

Bureau of Agricultural Economics.

See footnotes, Table 468.

TABLE 468.—*Index numbers of farm prices, United States, 1922–1931*

[August, 1909–July, 1914=100]

Group and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	Index no.	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*
GRAINS													
1922	91	102	111	114	115	111	105	100	97	101	106	111	105
1923	113	114	117	121	123	119	112	109	111	113	110	108	114
1924	110	113	114	113	114	116	130	141	140	150	147	155	129
1925	172	178	172	152	159	164	152	157	148	135	138	140	156
1926 [1]	143	140	133	131	131	130	125	128	121	123	121	120	129
1927 [1]	120	122	121	119	127	140	139	138	134	128	120	123	128
1928 [1]	125	128	136	144	160	152	142	120	117	116	110	112	130
1929 [1]	115	123	124	120	113	111	122	129	131	128	118	119	121
1930 [1]	118	115	107	110	105	106	92	101	100	92	80	80	100
1931 [1]	77	75	74	74	74	67	57	54	50	46	57	52	63
FRUITS AND VEGETABLES													
1922	159	173	181	190	206	197	174	129	109	101	101	104	152
1923	117	122	130	146	157	161	165	151	131	123	114	114	136
1924	118	123	123	128	132	146	142	138	113	109	108	110	124
1925	122	131	138	146	162	184	178	178	142	152	194	194	160
1926 [2]	214	218	220	253	240	216	195	166	136	136	142	137	189
1927 [2]	140	142	140	147	158	201	195	172	145	138	136	141	155
1928 [2]	144	153	174	179	181	168	156	137	127	114	109	108	146
1929 [2]	109	111	112	110	119	120	136	160	160	168	159	163	136
1930 [2]	167	168	169	187	193	193	173	149	148	127	114	108	158
1931 [2]	108	109	109	120	119	114	110	97	83	70	68	68	98
MEAT ANIMALS													
1922	95	108	118	117	119	121	120	114	112	113	108	107	113
1923	110	110	110	110	108	103	105	104	112	106	100	98	106
1924	101	102	104	106	107	105	103	116	115	121	115	113	109
1925	123	126	145	146	139	139	148	149	143	141	136	136	139
1926	140	146	147	146	148	154	152	144	148	148	142	140	146
1927	140	143	144	143	137	120	131	136	142	145	141	138	139
1928	138	139	139	142	151	150	157	162	174	160	150	143	150
1929	146	150	160	164	164	163	167	165	156	151	144	143	156
1930	146	150	151	146	142	141	127	119	128	123	118	112	134
1931	112	106	106	106	99	91	92	92	86	79	76	68	93
DAIRY PRODUCTS													
1922	140	134	133	131	126	128	127	129	133	136	140	147	134
1923	151	151	148	147	142	142	139	142	145	153	157	155	148
1924	152	150	146	134	128	126	123	120	126	130	132	137	134
1925	134	134	137	132	132	130	131	135	137	146	146	146	137
1926	147	143	141	133	130	128	129	128	133	134	141	144	136
1927	144	143	139	140	136	132	130	129	135	139	141	145	138
1928	145	145	142	139	136	134	134	135	141	143	144	146	140
1929	145	144	144	142	139	135	135	137	139	141	142	140	140
1930	135	129	126	126	123	118	115	117	123	125	124	117	123
1931	107	101	101	99	91	86	85	87	92	95	95	92	94
POULTRY PRODUCTS													
1922	176	140	118	110	114	113	111	114	132	159	187	198	139
1923	175	151	130	117	117	114	116	126	144	165	191	198	145
1924	162	157	109	105	109	115	121	132	153	176	203	217	147
1925	213	166	124	127	131	135	141	148	152	175	208	213	161
1926	172	145	128	133	135	138	137	137	155	173	202	212	156
1927	173	145	115	114	112	102	112	122	143	167	189	195	141
1928	177	144	122	121	128	127	134	140	156	168	185	197	150
1929	161	158	144	127	134	140	143	151	165	181	200	204	159
1930	178	154	115	117	110	103	101	107	125	129	146	127	126
1931	110	79	92	90	77	81	83	93	99	110	123	120	96
COTTON AND COTTONSEED													
1922	129	128	131	135	144	160	166	166	160	168	186	195	156
1923	203	215	224	222	211	207	199	190	204	221	238	253	216
1924	255	247	219	226	222	219	215	219	175	182	179	176	211
1925	182	183	195	189	184	183	186	186	178	171	144	139	177
1926	138	142	133	135	130	132	126	130	134	94	88	81	122
1927	85	94	102	101	113	119	125	136	179	169	162	153	128
1928	152	141	147	154	166	162	170	153	142	147	146	148	152
1929	148	149	155	152	148	146	145	146	146	141	132	130	145
1930	128	121	113	120	119	115	99	94	83	76	80	73	102
1931	72	76	80	78	74	65	71	53	47	42	50	45	63

[1] Kafir omitted.

[2] Onions and cabbage omitted.

TABLE 468.—*Index numbers of farm prices, United States, 1922–1931*—Continued

[August, 1909–July, 1914=100]

Group and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
ALL GROUPS	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*
1922	114	118	123	123	127	128	126	120	119	123	126	131	124
1923	134	136	136	137	135	133	130	128	132	134	136	137	135
1924	137	136	131	130	129	130	132	139	132	138	137	139	134
1925	146	146	151	147	146	148	149	152	144	143	144	143	147
1926 [3]	143	143	140	140	139	139	136	133	134	130	130	127	135
1927 [3]	126	127	126	125	126	130	130	132	140	139	137	137	131
1928 [3]	137	135	137	140	148	145	145	139	141	137	134	134	139
1929 [3]	133	136	140	138	136	135	140	143	141	140	136	135	138
1930 [3]	134	131	126	127	124	123	111	108	111	106	103	97	117
1931 [3]	94	90	91	91	86	80	79	75	72	68	71	66	80

Bureau of Agricultural Economics. Prices of farm production received by producers collected monthly from a list of about 12,000 special price reporters. This list is made up almost entirely of country-town dealers, elevator managers, buyers, and merchants.

The commodities by groups are as follows: Grains—wheat, corn, oats, barley, rye, kafir; fruits and vegetables—apples, oranges, grapefruit, potatoes, sweetpotatoes, beans, onions, cabbage; meat animals—beef cattle, calves, hogs, sheep, lambs; dairy products—butter (represents butter, butterfat, and cream), milk; poultry products—chickens, eggs; cotton and cottonseed; all groups includes also horses (represents horses and mules), hay, flax, tobacco, and wool.

[3] Kafir, onions, and cabbage omitted.

TABLE 469.—*Index numbers of general trend of prices and wages 1910–1931*

[1910–1914=100]

Year and month	Wholesale prices of all commodities [1]	Industrial wages [2]	Prices paid by farmers for commodities used in— Living	Production	Living and production	Farm wage rates	Taxes [3]
	Index no.	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*
1910	103		98	98	98	97	
1911	95		100	103	101	97	
1912	101		101	98	100	101	
1913	102		100	102	100	104	
1914	99		102	99	101	101	100
1915	102	101	107	103	106	102	102
1916	125	114	125	121	123	112	104
1917	172	129	148	152	150	140	106
1918	192	160	180	176	178	176	118
1919	202	185	214	192	205	206	130
1920	225	222	227	175	206	239	155
1921	142	203	165	142	156	150	217
1922	141	197	160	140	152	146	232
1923	147	214	161	142	153	166	246
1924	143	218	162	143	154	166	249
1925	151	223	165	149	159	168	250
1926	146	229	164	144	156	171	253
1927	139	231	161	144	154	170	258
1928	141	232	162	146	156	169	263
1929	139	236	160	146	155	170	267
1930	126	226	151	140	146	152	266
1931	107	207				116	

Bureau of Agricultural Economics.

[1] Bureau of Labor Statistics. Index obtained by dividing the new series, 1926=100, by its pre-war average 1910–1914, 68.5.
[2] Average weekly earnings, New York State factories. June, 1914=100.
[3] Index of estimate of total taxes paid on all farm property. 1914=100.

TABLE 470.—*Estimated average property tax per acre on farm real estate, by geographic divisions, and United States, 1924–1930*

Geographic division	1924	1925	1926	1927	1928	1929	1930
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
New England	0.95	0.96	1.00	1.03	1.05	1.07	1.10
Middle Atlantic	1.17	1.21	1.20	1.22	1.22	1.23	1.24
East North Central	1.34	1.34	1.35	1.38	1.37	1.40	1.38
West North Central	.69	.68	.69	.70	.71	.72	.73
South Atlantic	.46	.48	.51	.52	.52	.54	.52
East South Central	.45	.45	.46	.46	.47	.48	.48
West South Central	.32	.32	.32	.33	.34	.35	.36
Mountain	.22	.23	.23	.23	.23	.24	.24
Pacific	.92	.93	.95	.97	1.01	1.01	1.02
United States	.64	.64	.65	.66	.67	.68	.68

Bureau of Agricultural Economics. Average tax per acre in 1924 based on the 1925 Census of Agriculture. Trends in the United States as a whole and in each geographic division since 1924 are based on weighted averages of replies to questionnaires sent each year to farmers in all parts of the country.

TABLE 471.—*Farm wage rates: Averages and index numbers, 1866–1931*

[1910–1914=100]

Year	Average yearly farm wage [1]: Per month—With board	Per month—Without board	Per day—With board	Per day—Without board	Weighted average wage rate per month [2]	Index numbers of farm wages
	Dols.	*Dols.*	*Dols.*	*Dols.*	*Dols.*	
1866 [3]	10.09	15.50	0.64	0.90	13.14	55
1869	9.97	15.50	.63	.87	12.93	54
1874 or 1875	11.16	17.10	.68	.94	14.19	59
1877 or 1879 [4]	10.86	16.79	.61	.84	13.34	56
1879 or 1880	11.70	17.53	.64	.89	14.14	59
1880 or 1881	12.32	18.52	.67	.92	14.82	62
1881 or 1882	12.88	19.11	.70	.97	15.48	65
1884 or 1885	13.08	19.22	.71	.96	15.58	65
1887 or 1888	13.29	19.67	.72	.98	15.87	66
1889 or 1890	13.29	19.45	.72	.97	15.79	66
1891 or 1892	13.48	20.02	.73	.98	16.06	67
1893	13.85	19.97	.72	.92	15.93	67
1894	12.70	18.57	.65	.84	14.60	61
1895	12.75	18.74	.65	.85	14.69	62
1898	13.29	19.16	.71	.94	15.58	65
1899	13.90	19.97	.75	.99	16.34	68
1902	15.51	22.12	.83	1.09	18.12	76
1906	18.73	26.19	1.03	1.32	21.92	92
1909	20.48	28.09	1.04	1.31	23.00	96
1910	19.58	28.04	1.07	1.40	23.08	97
1911	19.85	28.33	1.07	1.40	23.25	97
1912	20.46	29.14	1.12	1.44	24.01	101
1913	21.27	30.21	1.15	1.48	24.83	104
1914	20.90	29.72	1.11	1.44	24.26	101
1915	21.08	29.97	1.12	1.45	24.46	102
1916	23.04	32.58	1.24	1.60	26.83	112
1917	28.64	40.19	1.56	2.00	33.42	140
1918	35.12	49.13	2.05	2.61	42.12	176
1919	40.14	56.77	2.44	3.10	49.11	206
1920	47.24	65.05	2.84	3.56	57.01	239
1921	30.25	43.58	1.66	2.17	35.77	150
1922	29.31	42.09	1.64	2.14	34.91	146
1923	33.09	46.74	1.91	2.45	39.64	166
1924 [5]	33.34	47.22	1.88	2.44	39.67	166
1925 [5]	33.88	47.80	1.89	2.46	40.12	168
1926 [5]	34.86	48.86	1.91	2.48	40.88	171
1927 [5]	34.58	48.63	1.90	2.46	40.60	170
1928 [5]	34.66	48.65	1.88	2.43	40.44	169
1929 [5]	34.74	49.08	1.88	2.42	40.52	170
1930 [5]	31.14	44.59	1.65	2.16	36.24	152
1931 [5]	23.60	35.03	1.22	1.65	27.61	116

Bureau of Agricultural Economics.

[1] Yearly averages are from reports by crop reporters, giving average wages for the year in their localities.
[2] This column has significance only as an essential step in computing the wage index.
[3] Years 1866 to 1878 in gold.
[4] 1877 or 1878, 1878 or 1879 (combined).
[5] Weighted average of quarterly reports, April (weight 1), July (weight 5), October (weight 5), and January of the following year (weight 1).

TABLE 472.—*Male farm labor, by geographic divisions, quarterly, 1931*

Division	Per month, with board				Per month, without board				Per day, with board [1]				Per day, without board [1]			
	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.
	Dols.	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*	*Dols.*
North Atlantic	36.59	36.22	36.13	34.50	58.65	56.86	55.47	54.34	2.19	2.11	2.09	2.00	2.99	2.86	2.82	2.70
N. Cent., East	29.33	29.95	20.05	27.15	43.51	43.03	41.30	38.89	1.64	1.58	1.52	1.42	2.20	2.15	2.06	1.89
N. Cent., West	27.82	32.57	31.02	27.51	41.11	44.87	42.14	38.15	1.60	1.63	1.54	1.35	2.21	2.24	2.09	1.87
South Atlantic	19.53	17.50	17.58	16.07	28.93	26.44	26.17	23.88	1.00	.90	.91	.82	1.37	1.23	1.20	1.08
South Central	19.34	17.88	17.88	16.40	28.69	26.64	25.99	23.78	.95	.89	.88	.80	1.25	1.16	1.15	1.07
Western	42.65	43.07	40.17	36.95	63.73	65.02	61.84	55.83	1.98	1.96	1.81	1.69	2.75	2.73	2.50	2.32
United States	26.03	25.99	25.35	23.31	39.04	38.37	37.00	34.22	1.38	1.33	1.29	1.18	1.87	1.80	1.73	1.59

Bureau of Agricultural Economics. As reported by field and crop reporters.

[1] Includes piecework.

TABLE 473.—*Farm real estate: Index numbers of estimated value per acre, by geographic divisions, 1912–1931* [1]

[1912–1914=100 per cent]

Geographic division	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
	Index no.	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*	*Index no.*
New Eng	99	101	100	99	102	112	117	123	140	135	134	130	128	127	128	127	127	126	127	126
Middle Atl	98	100	102	100	104	112	117	121	136	127	118	116	114	114	113	111	110	109	106	101
E. N. Cent	97	100	103	104	110	116	127	135	161	151	132	128	121	116	111	104	101	100	96	87
W. N. Cent	97	100	103	105	114	122	134	147	184	174	150	142	132	126	121	115	113	112	109	97
South Atl	98	100	103	98	108	119	135	161	198	174	146	152	151	148	149	137	134	132	128	116
E. S. Cent	97	100	103	99	109	120	140	162	199	163	149	149	142	141	139	133	130	129	128	117
W. S. Cent	96	100	104	100	103	116	134	143	177	159	136	132	136	144	144	139	137	136	136	121
Mountain	98	102	100	98	98	106	117	130	151	133	122	115	110	105	103	101	101	101	102	100
Pacific	94	99	106	107	111	122	129	134	156	155	151	148	147	146	144	143	142	142	142	140
United States	97	100	103	103	108	117	129	140	170	157	139	135	130	127	124	119	117	116	115	106

Bureau of Agricultural Economics. Based on values as reported by crop reporters. Values as reported by the census for 1910, 1920, and 1925 will be found in Table 511 of the 1927 Yearbook.

[1] All farm land with improvements, as of Mar. 1. Owing to rounding of figures, 1912–14 will not always equal exactly 100 per cent.

TABLE 474.—*Number of farms per 1,000 changing ownership by various methods, by geographic divisions, 12 months ended March 15, 1928–1931*

Geographic division	Voluntary sales and trades [1]				Forced sales and related defaults, total				Inheritance and gift			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	No. per 1,000	*No. per 1,000*	*No. per 1,000*	*No. per 1,000*	*No. per 1,000*	*No. per 1,000*	*No. per 1,000*	*No. per 1,000*	*No. per 1,000*	*No. per 1,000*	*No. per 1,000*	*No. per 1,000*
New England	34.9	30.4	30.7	30.7	10.7	10.9	11.2	9.7	10.4	9.6	10.3	8.8
Middle Atlantic	33.7	28.2	28.2	24.5	11.8	12.0	13.1	13.8	8.6	8.0	8.2	8.5
East North Central	24.0	21.0	20.8	18.6	20.7	19.1	22.3	24.0	9.7	8.9	9.4	9.3
West North Central	23.9	22.4	22.9	18.9	32.4	25.9	27.5	31.3	8.4	8.5	9.8	9.7
South Atlantic	20.0	18.3	18.2	14.5	23.3	23.0	23.2	32.2	10.6	10.4	11.4	12.5
East South Central	27.5	23.4	23.9	19.4	20.0	15.2	16.1	25.9	9.2	8.8	9.3	9.9
West South Central	27.9	25.5	24.2	16.7	18.5	15.2	16.8	22.4	7.8	7.2	7.6	7.4
Mountain	34.8	35.6	38.7	24.8	39.4	29.1	29.4	36.4	5.6	6.0	7.0	6.9
Pacific	34.3	28.3	30.1	22.1	19.9	17.5	15.2	25.0	7.1	6.5	7.3	6.6
United States	26.3	23.5	23.7	19.0	22.8	19.5	20.8	26.1	8.9	8.5	9.3	9.4

Geographic division	Administrators' and executors' sales [2]				Total, all classes [3]			
	1928	1929	1930	1931	1928	1929	1930	1931
	No. per 1,000	*No. per 1,000*	*No. per 1,000*	*No. per 1,000*	*No. per 1,000*	*No. per 1,000*	*No. per 1,000*	*No. per 1,000*
New England	7.1	6.5	6.1	5.6	64.1	58.2	60.2	56.1
Middle Atlantic	8.2	7.2	7.0	7.0	64.1	56.6	58.0	55.5
East North Central	8.3	6.7	7.8	7.5	63.9	57.0	61.6	60.9
West North Central	6.5	6.1	6.2	5.4	72.7	64.1	68.0	66.8
South Atlantic	7.9	7.5	7.9	6.5	62.9	60.3	62.7	63.3
East South Central	6.6	5.4	5.8	5.6	64.4	53.7	56.5	62.6
West South Central	4.2	3.6	3.3	3.4	59.6	52.5	53.3	51.6
Mountain	3.7	4.1	4.7	3.6	85.4	76.2	81.7	72.8
Pacific	4.4	3.7	3.6	3.6	67.1	57.5	57.6	58.1
United States	6.7	5.4	6.1	5.7	66.0	58.0	61.5	61.9

Bureau of Agricultural Economics. Based on returns from crop reporters.

[1] Including contracts to purchase (but not options).
[2] Includes all other sales in settlement of estates.
[3] Indluding miscellaneous and unclassified.

TABLE 475.—*Bankruptcies among farmers, number and percentage of total, by geographic divisions, fiscal years ended June 30, 1910–1930*

Year	New England		Middle Atlantic		East North Central		West North Central		South Atlantic	
	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies
	Number	*Per cent*	*Number*	*Per cent*	*Number*	*Per cent*	*Number*	*Per cent*	*Number*	*Per cent*
1910	123	6.0	52	1.8	98	3.2	287	15.9	63	4.5
1911	85	4.4	48	1.6	89	3.4	167	11.0	78	5.1
1912	148	7.4	58	1.7	78	2.7	219	14.2	79	4.7
1913	81	4.0	66	1.8	143	5.0	258	13.7	85	4.5
1914	88	4.0	63	2.0	91	2.8	289	14.6	100	4.5
1915	112	4.8	90	2.4	94	2.8	290	13.8	177	5.5
1916	143	5.3	88	2.0	146	3.9	276	12.6	369	9.8
1917	152	4.8	130	2.7	142	3.6	325	13.6	407	12.2
1918	125	4.3	97	2.4	126	3.6	267	11.4	410	13.8
1919	104	4.1	89	2.4	75	2.2	156	8.1	291	15.8
1920	72	3.8	67	2.2	83	3.3	213	12.0	169	10.1
1921	91	6.2	91	3.3	62	3.6	324	20.6	297	13.7
1922	92	4.9	77	2.6	247	9.0	1,066	40.3	678	17.0
1923	146	4.9	148	3.1	569	11.5	2,005	46.1	959	17.0
1924	196	5.8	171	3.2	684	12.2	2,785	42.5	1,085	16.9
1925	169	5.2	190	2.6	760	13.4	2,889	39.2	1,037	17.6
1926	145	4.6	224	3.4	844	11.3	2,813	35.4	747	12.7
1927	105	3.1	224	3.1	719	9.2	2,404	30.3	585	10.0
1928	162	3.5	274	3.5	874	9.3	1,729	24.2	685	9.9
1929	145	3.2	270	3.2	980	8.8	1,471	21.2	515	7.0
1930	141	2.8	305	3.6	973	8.0	1,257	19.2	491	5.9
1931	104	2.3	353	3.6	1,025	8.1	1,010	17.9	455	5.8

Year	East South Central		West South Central		Mountain		Pacific		United States	
	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies
	Number	*Per cent*	*Number*	*Per cent*	*Number*	*Per cent*	*Number*	*Per cent*	*Number*	*Per cent*
1910	38	2.8	66	8.3	35	7.1	87	9.0	849	5.7
1911	65	5.3	72	8.2	35	7.0	40	4.2	679	4.8
1912	91	5.7	62	7.0	55	9.1	47	4.6	837	5.4
1913	83	4.1	89	7.4	66	8.9	71	5.4	942	5.4
1914	100	4.2	81	6.8	118	15.7	115	6.9	1,045	5.6
1915	127	4.4	97	9.3	159	19.2	100	5.9	1,246	5.9
1916	164	6.8	178	9.4	179	17.0	115	6.1	1,658	6.9
1917	184	6.8	217	12.2	193	17.4	156	7.3	1,906	7.5
1918	179	5.3	186	15.1	105	11.4	137	6.7	1,632	7.0
1919	126	5.6	164	14.9	102	11.9	100	5.8	1,207	6.3
1920	108	6.8	95	10.0	104	16.2	86	5.9	997	6.4
1921	100	3.9	124	15.7	177	23.8	97	7.2	1,363	9.0
1922	201	4.9	264	19.5	419	38.2	192	11.0	3,236	14.4
1923	420	9.1	539	20.4	730	43.3	424	16.3	5,940	17.4
1924	483	9.7	788	22.3	1,040	46.3	540	15.7	7,772	18.7
1925	517	9.7	650	23.6	1,071	41.8	589	14.6	7,872	17.8
1926	579	9.5	764	25.6	1,142	42.7	511	11.9	7,769	16.5
1927	615	9.7	567	20.7	609	31.8	468	10.0	6,296	13.1
1928	521	6.9	561	19.5	420	24.0	453	8.5	5,679	10.6
1929	352	4.5	484	17.3	335	20.9	387	6.1	4,939	8.7
1930	336	3.8	375	14.7	260	17.1	326	4.6	4,464	7.4
1931	338	3.6	282	10.5	201	13.3	255	4.4	4,023	6.7

Bureau of Agricultural Economics. Compiled from annual reports of the Attorney General.

TABLE 476.—*Population: Total population, number and percentage of total population living in rural areas, and percentage of all gainfully employed persons 10 years or older engaged in agricultural pursuits, census years, 1790–1930*

Census years	Total population	Rural population living— Outside of incorporated places of 8,000 or more		Outside of incorporated places of 2,500 or more	On farms	Percentage of all gainfully employed persons engaged in agriculture[1]
	Number	*Number*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
1790	3, 929, 214	3, 797, 742	96. 7			
1800	5, 308, 483	5, 097, 610	96. 0			
1810	7, 239, 881	6, 882, 961	95. 1			
1820	9, 638, 453	9, 163, 318	95. 1			83. 1
1830	12, 866, 020	12, 001, 511	93. 3			
1840	17, 069, 453	15, 615, 459	91. 5			77. 5
1850	23, 191, 876	20, 294, 290	87. 5			
1860	31, 443, 321	26, 371, 065	83. 9			
1870	38, 558, 371	30, 486, 496	79. 1			47. 5
1880	50, 155, 783	38, 790, 085	77. 4	71. 4		44. 3
1890	62, 947, 714	44, 703, 475	71. 0	64. 6		39. 2
1900	75, 994, 575	50, 976, 240	67. 1	60. 0		35. 7
1910	91, 972, 266	56, 401, 932	61. 3	54. 2	34. 7	33. 2
1920	105, 710, 620	59, 402, 980	56. 2	48. 6	20. 5	26. 3
1930	122, 775, 046	62, 441, 594	50. 9	43. 8	24. 6	21. 5

Bureau of Agricultural Economics. Compiled from reports of Bureau of the Census.

[1] Some changes in classification of occupations occurred during this time so that the figures are not strictly comparable. In general, however, the trend is indicated closely.

TABLE 477.—*Population: Total, urban, rural-farm, and rural nonfarm by geographic divisions, census years, 1920, 1930*

Geographic divisions	Total 1920	Total 1930	Urban[1] 1920	Urban[1] 1930	Rural-farm[2] 1920	Rural-farm[2] 1930	Rural-nonfarm[3] 1920	Rural-nonfarm[3] 1930
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
New England	7, 400, 909	8, 166, 341	5, 865, 073	6, 311, 976	535, 422	499, 083	1. 000, 414	1, 355, 282
Middle Atlantic	22, 261, 144	26, 260, 750	16, 672. 595	20, 394. 707	1, 861, 161	1, 673, 694	3, 727, 388	4, 192, 349
East North Central	21, 475, 543	25, 297, 185	13, 049, 272	16, 794, 908	4, 887, 204	4, 453, 114	3. 539, 067	4, 049, 163
West North Central	12, 544, 249	13, 296. 915	4, 727, 372	5, 556, 181	5, 153, 183	5, 035, 561	2, 663, 694	2, 705, 173
South Atlantic	13, 990, 272	15, 793, 589	4, 338, 792	5, 698, 122	6, 397, 757	5, 878, 956	3, 253. 723	4, 216, 511
East South Central	8, 893, 307	9. 887, 214	1, 994, 207	2. 778, 687	5, 174, 806	5, 084, 435	1, 724, 294	2. 024, 092
West South Central	10, 242. 224	12, 176, 830	2, 970, 829	4, 427, 439	5, 210. 570	5, 307. 939	2, 060, 825	2, 441, 452
Mountain	3, 336, 101	3. 701, 789	1, 214. 980	1, 457, 922	1, 152, 993	1, 123, 693	968, 128	1, 120, 174
Pacific	5, 566, 871	8, 194, 433	3, 471, 483	5, 534, 881	985. 544	1, 101. 038	1, 109, 844	1, 558, 514
United States	105, 710, 620	122, 775, 046	54, 304, 603	68, 954, 823	31, 358, 640	30, 157, 513	20, 047, 377	23, 662, 710

Bureau of the Census.

[1] Persons living in incorporated places of 2,500 or more.
[2] Persons living on farms located outside of incorporated places of 2,500 or more.
[3] Persons living outside of incorporated places of 2,500 or more who do not live on farms.

TABLE 478.—*Number of farms, land in farms, harvested acreage, and land in harvested crops, census years*

State and division	Number of farms			Land in farms			Harvested acreage,[1] 1919	Land in harvested crops	
	1920	1925	1930	1920	1925	1930		1924	1929
				Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Maine	48, 227	50, 033	39, 006	5, 425, 968	5, 161, 428	4, 639, 938	1, 648, 521	1, 605, 576	1, 304, 014
New Hampshire	20, 523	21, 065	14, 906	2, 603, 806	2, 262, 064	1, 960, 061	541, 495	523, 386	380, 105
Vermont	29, 075	27, 786	24, 898	4, 235, 811	3, 925, 683	3, 896, 097	1, 189, 020	1, 127, 004	1, 073, 693
Massachusetts	32, 001	33, 454	25, 598	2, 494, 477	2, 367, 629	2, 005, 461	657, 082	625, 068	474, 167
Rhode Island	4, 083	3, 911	3, 322	331, 600	309, 013	279, 361	74, 316	69, 368	55, 214
Connecticut	22, 655	23, 240	17, 195	1, 898, 980	1, 832, 110	1, 502, 279	511, 848	497, 435	372, 147
New England	156, 564	159, 489	124, 925	16, 990, 642	15, 857, 927	14, 283, 197	4, 622, 282	4, 447, 837	3, 659, 340
New York	193, 195	188, 754	159, 806	20, 632, 803	19, 269, 926	17, 979, 633	8, 788, 658	8, 290, 335	6, 958, 936
New Jersey	29, 702	29, 671	25, 378	2, 282, 585	1, 924, 545	1, 758, 027	1, 093, 174	907, 754	776, 954
Pennsylvania	202, 250	200, 443	172, 419	17, 657, 513	16, 296, 468	15, 309, 485	8, 398, 144	7, 283, 511	6, 587, 707
Middle Atlantic	425, 147	418, 868	357, 603	40, 572, 901	37, 490, 939	35, 047, 145	18, 279, 976	16, 481, 600	14, 323, 597
Ohio	256, 695	244, 703	219, 296	23, 515, 888	22, 219, 248	21, 514, 059	12, 448, 866	10, 703, 042	10, 115, 652
Indiana	205, 126	195, 786	181, 570	21, 063, 332	19, 915, 120	19, 688, 675	12, 325, 426	10, 615, 744	10, 213, 813
Illinois	237, 181	225, 601	214, 497	31, 974, 775	30, 731, 947	30, 695, 339	20, 943, 321	19, 755, 447	18, 958, 337
Michigan	196, 447	192, 327	169, 372	19, 032, 961	18, 035, 290	17, 118, 951	9, 632, 720	8, 501, 903	7, 738, 221
Wisconsin	189, 295	193, 155	181, 767	22, 148, 223	21, 850, 853	21, 874, 155	9, 790, 136	9, 538, 023	9, 618, 331
East North Central	1, 084, 744	1, 051, 572	966, 502	117, 735, 179	112, 752, 458	110, 891, 179	65, 140, 469	59, 114, 159	56, 644, 354
Minnesota	178, 478	188, 231	185, 255	30, 221, 758	30, 059, 137	30, 913, 367	16, 781, 770	17, 929, 704	18, 445, 306
Iowa	213, 439	213, 490	214, 928	33, 474, 896	33, 280, 813	34, 019, 332	21, 216, 389	21, 466, 350	22, 275, 868
Missouri	263, 004	260, 473	255, 940	34, 774, 679	32, 641, 893	33, 743, 019	15, 983, 353	13, 720, 574	13, 175, 947
North Dakota	77, 690	75, 970	77, 975	36, 214, 751	34, 327, 410	38, 657, 894	19, 649, 375	19, 877, 232	21, 254, 660
South Dakota	74, 637	79, 537	83, 157	34, 636, 491	32, 017, 986	36, 470, 083	15, 092, 743	15, 792, 987	17, 856, 178
Nebraska	124, 417	127, 734	129, 458	42, 225, 475	42, 024, 775	44, 708, 565	19, 295, 288	19, 810, 362	21, 399, 340
Kansas	165, 286	165, 879	166, 042	45, 425, 179	43, 729, 129	46, 975, 647	22, 279, 272	22, 381, 618	24, 308, 361
West North Central	1, 096, 951	1, 111, 314	1, 112, 755	256, 973, 229	248, 081, 143	265, 487, 907	130, 298, 190	130, 978, 827	138, 715, 660
Delaware	10, 140	10, 257	9, 707	944, 511	899, 641	900, 815	494, 901	404, 209	407, 609
Maryland	47, 908	49, 001	43, 203	4, 757, 999	4, 433, 398	4, 374, 398	2, 110, 741	1, 777, 513	1, 741, 615
District of Columbia	204	139	104	5, 668	3, 813	3, 071	2, 288	2, 197	1, 737
Virginia	186, 242	193, 723	170, 610	18, 561, 112	17, 210, 174	16, 728, 620	5, 033, 571	3, 963, 570	3, 975, 307
West Virginia	87, 289	90, 380	82, 641	9, 569, 790	8, 979, 847	8, 802, 348	2, 131, 903	1, 676, 570	1, 655, 380
North Carolina	269, 763	283, 482	279, 708	20, 021, 736	18, 593, 670	18, 055, 103	6, 178, 532	5, 574, 921	5, 809, 741
South Carolina	192, 693	172, 767	157, 931	12, 426, 675	10, 638, 900	10, 393, 113	5, 572, 558	4, 311, 136	4, 136, 890

Georgia	310, 732	249, 095	255, 598	25, 441, 061	21, 945, 496	22, 078, 630	11, 415, 550	8, 127, 577	8, 337, 145
Florida	54, 005	59, 217	58, 966	6, 046, 691	5, 864, 519	5, 026, 617	1, 553, 615	1, 369, 050	1, 454, 254
South Atlantic	1, 158, 976	1, 108, 061	1, 058, 468	97, 775, 243	88, 569, 458	86, 362, 715	34, 493, 659	27, 211, 743	27, 519, 597
Kentucky	270, 626	258, 524	246, 499	21, 612, 772	19, 913, 104	19, 927, 286	6, 773, 958	5, 183, 702	5, 330, 821
Tennessee	252, 774	252, 669	245, 657	19, 510, 856	17, 901, 139	18, 003, 241	7, 153, 509	6, 209, 428	6, 106, 300
Alabama	256, 099	237, 631	257, 395	19, 576, 856	16, 739, 139	17, 554, 635	7, 836, 064	6, 641, 355	7, 113, 937
Mississippi	272, 101	257, 228	312, 663	18, 196, 979	16, 053, 243	17, 332, 195	6, 603, 072	5, 661, 671	6, 597, 112
East South Central	1, 051, 600	1, 006, 052	1, 062, 214	78, 897, 463	70, 606, 625	72, 817, 357	28, 366, 603	23, 696, 156	25, 148, 170
Arkansas	232, 604	221, 991	242, 334	17, 456, 750	15, 632, 439	16, 052, 962	6, 715, 048	6, 226, 830	6. 581, 834
Louisiana	135, 463	132, 450	161, 445	10, 019, 822	8, 837, 502	9, 355, 437	4, 022, 244	3, 484, 753	4, 068, 151
Oklahoma	191, 988	197, 218	203, 866	31, 951, 934	30, 868, 965	33, 790, 817	15, 339, 040	14, 548, 683	15, 553, 185
Texas	436, 033	465, 646	495, 489	114, 020, 621	109, 674, 410	124, 707, 130	25, 467, 351	27, 074, 869	30, 634, 370
West South Central	996, 088	1, 017, 305	1, 103, 134	173, 449, 127	165, 013, 316	183, 906, 346	51, 543, 683	51, 335, 135	56, 837, 540
Montana	57, 677	46, 904	47, 495	35, 070, 656	32, 735, 723	44, 659, 152	3, 911, 989	6, 416. 335	7, 840, 979
Idaho	42, 106	40, 592	41, 674	8, 375, 873	8, 116, 147	9, 346, 908	2, 784, 908	2, 578, 799	3, 150, 097
Wyoming	15, 748	15, 512	16, 011	11, 809, 351	18, 663, 308	23, 525, 234	1, 193, 225	1, 572, 625	2, 007, 751
Colorado	59, 934	58, 020	59, 956	24, 462, 014	24, 167, 270	28, 876, 171	5, 327, 378	5, 948, 437	6, 750, 398
New Mexico	29, 844	31, 687	31, 404	24, 409, 633	27, 850, 325	30, 822, 034	1, 179, 193	1, 345, 705	1, 493, 998
Arizona	9, 975	10, 802	14, 173	5, 802, 126	11, 065, 291	10, 526, 627	458, 572	456, 948	478, 411
Utah	25, 662	25, 992	27, 159	5, 050, 410	5, 000, 724	5, 613, 101	1, 059, 729	1, 024, 566	1, 159, 890
Nevada	3, 163	3, 883	3, 442	2, 357, 163	4, 090, 586	4, 080, 906	3, 92, 327	362, 552	397, 504
Mountain	244, 109	233, 392	241, 314	117, 337, 226	131, 689, 374	157, 450, 133	16, 307, 321	19, 705, 967	23, 279, 028
Washington	66, 288	73, 267	70, 904	13, 244, 720	12, 610, 310	13, 533, 778	4, 228, 636	3, 262, 824	3, 658, 514
Oregon	50, 206	55, 911	55, 153	13, 542, 318	14, 130, 847	16, 548, 678	2, 968, 458	2, 592, 219	2, 906, 324
California	117, 670	136, 409	135, 676	29, 365, 667	27, 516, 955	30, 442, 581	6, 840, 656	5, 722, 800	6, 549, 967
Pacific	234, 164	265, 587	261, 733	56, 152, 705	54, 258, 112	60. 525, 037	14, 037, 750	11, 577, 843	13, 114, 805
United States	6, 448, 343	6, 371, 640	6, 288, 648	955, 883, 715	924, 319, 352	986, 771, 016	363, 089, 933	344, 549, 267	359, 242, 091

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census.

[1] Some land was double cropped.

TABLE 479.—*Number of farms by tenure of operator and percentage of all farms operated by tenants, 1920 and 1930*

Geographic division and State	Owner operators				Managers	
	Full owners		Part owners		1920	1930
	1920	1930	1920	1930		
New England:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Maine	44,224	35,468	1,213	1,280	786	503
New Hampshire	17,836	12,966	768	789	546	355
Vermont	23,926	20,662	1,195	1,347	568	480
Massachusetts	26,515	21,410	1,572	1,788	1,627	958
Rhode Island	2,971	2,523	274	285	205	99
Connecticut	18,369	14,271	1,297	1,315	1,070	541
Middle Atlantic:						
New York	139,153	124,206	12,564	11,835	4,376	2,652
New Jersey	20,752	19,564	1,137	1,207	987	659
Pennsylvania	144,698	134,423	8,800	7,860	4,490	2,742
East North Central:						
Ohio	157,116	136,332	20,870	23,517	3,065	1,843
Indiana	112,664	97,553	24,546	27,964	2,329	1,478
Illinois	100,903	85,069	31,671	34,823	3,411	2,123
Michigan	139,874	118,928	19,532	22,719	2,319	1,530
Wisconsin	149,390	132,778	10,220	14,209	2,427	1,659
West North Central:						
Minnesota	112,880	97,878	19,864	28,692	1,596	1,047
Iowa	99,008	85,272	22,880	26,061	2,487	1,980
Missouri	153,852	127,989	31,178	37,329	2,247	1,546
North Dakota	34,051	23,807	22,866	26,298	855	470
South Dakota	27,253	22,372	20,562	23,237	781	454
Nebraska	50,565	43,301	19,107	24,117	1,315	1,020
Kansas	65,640	57,151	31,450	37,611	1,495	954
South Atlantic:						
Delaware	5,688	5,816	322	444	144	165
Maryland	30,842	28,333	1,963	2,490	1,262	939
District of Columbia	91	53	9	6	19	21
Virginia	121,454	104,956	14,909	16,148	2,134	1,536
West Virginia	66,220	60,581	5,881	5,992	1,090	721
North Carolina	131,847	115,765	19,529	25,680	928	648
South Carolina	60,089	45,515	7,635	8,955	738	693
Georgia	94,575	70,596	7,548	9,206	1,655	1,406
Florida	35,757	35,485	2,730	3,909	1,829	2,835
East South Central:						
Kentucky	159,206	135,215	20,121	22,188	969	675
Tennessee	129,532	109,853	18,550	21,673	807	611
Alabama	95,548	75,144	11,541	15,228	741	603
Mississippi	83,768	77,382	7,542	8,665	989	999
West South Central:						
Arkansas	98,037	72,597	14,610	16,412	736	634
Louisiana	51,895	46,893	5,359	6,266	828	735
Oklahoma	69,786	53,647	23,431	24,067	935	823
Texas	171,427	152,852	29,783	37,663	2,514	3,314
Mountain:						
Montana	38,431	20,101	11,840	15,252	899	514
Idaho	30,299	24,194	4,348	6,318	758	603
Wyoming	10,681	7,896	2,722	4,299	377	296
Colorado	35,553	26,929	9,738	11,497	880	838
New Mexico	21,533	19,930	4,223	4,810	433	334
Arizona	6,970	9,727	899	1,567	305	548
Utah	19,134	19,046	3,445	4,562	296	230
Nevada	2,493	2,464	206	306	168	227
Pacific:						
Washington	44,832	49,702	7,869	7,886	1,168	1,238
Oregon	33,300	36,674	6,563	7,847	916	842
California	75,882	90,375	11,698	13,131	4,949	7,768
New England	133,841	107,300	6,319	6,804	4,802	2,936
Middle Atlantic	304,603	278,193	22,501	20,902	9,853	6,053
East North Central	659,947	570,660	106,839	123,232	13,551	8,633
West North Central	543,249	457,770	167,907	203,345	10,776	7,471
South Atlantic	546,563	467,100	60,526	72,830	9,799	8,964
East South Central	468,054	397,594	57,754	67,754	3,506	2,888
West South Central	391,145	325,989	73,183	84,408	5,013	5,506
Mountain	165,094	130,287	37,421	48,611	4,116	3,590
Pacific	154,014	176,751	26,130	28,864	7,033	9,848
United States	3,366,510	2,911,644	558,580	656,750	68,449	55,889

Table 479.—Numbers of farms by tenure of operator and percentage of all farms operated by tenants, 1920 and 1930—Continued

Geographic division and State	Tenants					
	Southern croppers		Tenants, including croppers		Percentage of all farms	
	1920	1930	1920	1930	1920	1930
New England:	*Number*	*Number*	*Number*	*Number*	*Per cent*	*Per cent*
Maine			2,004	1,755	4.2	4.5
New Hampshire			1,373	796	6.7	5.3
Vermont			3,386	2,409	11.6	9.7
Massachusetts			2,287	1,442	7.1	5.6
Rhode Island			633	415	15.5	12.5
Connecticut			1,919	1,068	8.5	6.2
Middle Atlantic:						
New York			37,102	21,113	19.2	13.2
New Jersey			6,826	3,948	23.0	15.6
Pennsylvania			44,262	27,394	21.9	15.9
East North Central:						
Ohio			75,644	57,604	29.5	26.3
Indiana			65,587	54,575	32.0	30.1
Illinois			101,196	92,482	42.7	43.1
Michigan			34,722	26,195	17.7	15.5
Wisconsin			27,258	33,121	14.4	18.2
West North Central:						
Minnesota			44,138	57,638	24.7	31.1
Iowa			89,064	101,615	41.7	47.3
Missouri			75,727	89,076	28.8	34.8
North Dakota			19,918	27,400	25.6	35.1
South Dakota			26,041	37,094	34.9	44.6
Nebraska			53,430	61,020	42.9	47.1
Kansas			66,701	70,326	40.4	42.3
South Atlantic:						
Delaware	208	225	3,986	3,282	39.3	33.8
Maryland	1,459	1,646	13,841	11,441	28.9	26.5
District of Columbia			85	24	41.7	23.1
Virginia	13,715	17,253	47,745	47,970	25.6	28.1
West Virginia	1,628	1,834	14,098	15,347	16.2	18.6
North Carolina	39,939	69,091	117,459	137,615	43.5	49.2
South Carolina	43,789	48,939	124,231	102,768	64.5	65.1
Georgia	97,497	100,854	206,954	174,390	66.6	68.2
Florida	4,291	4,816	13,689	16,737	25.3	28.4
East South Central:						
Kentucky	29,450	30,250	90,330	88,421	33.4	35.9
Tennessee	38,078	50,304	103,885	113,520	41.1	46.2
Alabama	47,897	65,134	148,269	166,420	57.9	64.7
Mississippi	86,859	135,293	179,802	225,617	66.1	72.2
West South Central:						
Arkansas	47,665	75,034	119,221	152,691	51.3	63.0
Louisiana	31,309	49,428	77,381	107,551	57.1	66.6
Oklahoma	8,926	21,055	97,836	125,329	51.0	61.5
Texas	68,381	105,122	232,309	301,660	53.3	60.9
Mountain:						
Montana			6,507	11,628	11.3	24.5
Idaho			6,701	10,559	15.9	25.3
Wyoming			1,968	3,520	12.5	22.0
Colorado			13,763	20,692	23.0	34.5
New Mexico			3,655	6,330	12.2	20.2
Arizona			1,801	2,331	18.1	16.4
Utah			2,787	3,321	10.9	12.2
Nevada			296	445	9.4	12.9
Pacific:						
Washington			12,419	12,078	18.7	17.0
Oregon			9,427	9,790	18.8	17.8
California			25,141	24,402	21.4	18.0
New England			11,602	7,885	7.4	6.3
Middle Atlantic			88,190	52,455	20.7	14.7
East North Central			304,407	263,977	28.1	27.3
West North Central			375,019	444,169	34.2	39.9
South Atlantic	202,526	244,658	542,088	509,574	46.8	48.1
East South Central	202,284	280,981	522,286	593,978	49.7	55.9
West South Central	156,281	250,639	526,747	687,231	52.9	62.3
Mountain			37,478	58,826	15.4	24.4
Pacific			46,987	46,270	20.1	17.7
United States	561,091	776,278	2,454,804	2,664,365	38.1	42.4

Bureau of Agricultural Economics.

TABLE 480.—*Farm mortgage debt: Estimated total for all farms, by States, January 1, 1910–1930*

State and division	1910 [1]	1920	1925	1928	1930 [2]
	1,000 dollars	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
Maine	13, 210	20, 890	26, 097	25, 252	24, 823
New Hampshire	5, 870	8, 600	7, 732	7, 780	9, 901
Vermont	15, 850	29, 040	28, 001	28, 322	33, 102
Massachusetts	22, 890	34, 180	32, 207	31, 262	42, 550
Rhode Island	2, 210	2, 350	2, 435	2, 455	3, 854
Connecticut	16, 080	25, 800	27, 276	27, 423	30, 514
New England	76, 110	120, 860	123, 748	122, 494	144, 744
New York	154, 190	224, 060	226, 776	219, 812	247, 633
New Jersey	31, 720	39, 500	41, 741	40, 370	56, 884
Pennsylvania	95, 620	133, 080	120, 281	116, 432	174, 037
Middle Atlantic	281, 530	396, 640	388, 798	376, 614	478, 554
Ohio	113, 320	210, 760	214, 409	222, 101	259, 630
Indiana	111, 280	206, 600	264, 483	277, 269	266, 989
Illinois	266, 780	502, 860	650, 353	685, 365	631, 266
Michigan	109, 970	215, 740	228, 089	235, 399	230, 377
Wisconsin	193, 600	455, 470	504, 553	529, 992	502, 549
East North Central	794, 950	1, 591, 420	1, 861, 887	1, 950, 126	1, 890, 811
Minnesota	146, 160	455, 540	553, 784	558, 458	530, 025
Iowa	431, 500	1, 098, 970	1, 424, 352	1, 402, 178	1, 098, 610
Missouri	202, 650	385, 790	449, 022	447, 351	428, 227
North Dakota	101, 450	267, 780	226, 714	230, 250	204, 598
South Dakota	88, 700	278, 880	372, 004	370, 946	295, 725
Nebraska	161, 850	416, 860	617, 930	599, 418	560, 973
Kansas	163, 770	295, 870	482, 596	447, 586	487, 122
West North Central	1, 296, 080	3, 199, 690	4, 126, 402	4, 056, 187	3, 605, 280
Delaware	6, 500	8, 990	8, 695	9, 469	11, 841
Maryland	29, 580	49, 230	50, 422	54, 980	64, 825
District of Columbia	290	340	304	354	642
Virginia	24, 000	61, 600	79, 709	87, 117	88, 865
West Virginia	8, 210	15, 960	18, 570	20, 155	24, 283
North Carolina	18, 960	56, 580	78, 606	90, 866	104, 979
South Carolina	20, 530	51, 220	68, 735	77, 214	67, 507
Georgia	28, 800	83, 840	109, 060	123, 305	100, 845
Florida	4, 380	19, 710	25, 508	28, 436	45, 140
South Atlantic	141, 250	347, 470	439, 609	491, 896	503, 927
Kentucky	40, 510	104, 100	94, 549	103, 798	97, 668
Tennessee	26, 850	83, 130	85, 857	96, 711	87, 313
Alabama	24, 880	55, 450	66, 410	69, 488	83, 764
Mississippi	31, 320	77, 420	109, 562	111, 500	96, 864
East South Central	123, 560	320, 100	356, 378	381, 497	365, 609
Arkansas	22, 200	76, 870	97, 809	103, 464	85, 577
Louisiana	19, 090	41, 250	57, 910	61, 760	61, 379
Oklahoma	77, 680	188, 890	218, 963	228, 513	214, 033
Texas	172, 240	396, 670	485, 587	507, 515	543, 951
West South Central	291, 210	703, 680	860, 269	901, 252	904, 940
Montana	19, 620	154, 940	116, 616	104, 862	129, 200
Idaho	24, 270	115, 350	107, 355	100, 033	106, 908
Wyoming	7, 820	32, 970	43, 364	40, 922	42, 948
Colorado	41, 800	138, 400	153, 727	144, 464	146, 462
New Mexico	4, 810	23, 670	28, 784	26, 900	30, 729
Arizona	4, 880	31, 790	29, 545	29, 006	28, 743
Utah	7, 170	35, 550	39, 152	36, 367	46, 273
Nevada	3, 340	11, 880	15, 244	13, 997	14, 737
Mountain	113, 710	544, 550	533, 787	496, 551	546, 000
Washington	45, 040	116, 740	121, 371	120, 523	131, 299
Oregon	34, 950	91, 090	105, 503	110, 875	116, 805
California	122, 080	425, 460	442, 868	460, 511	548, 421
Pacific	202, 070	633, 290	669, 742	691, 909	796, 525
United States	3, 320, 470	7, 857, 700	9, 360, 620	9, 468, 526	9, 241, 390

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[1] Revised. [2] Preliminary.

TABLE 481.—*Agricultural loans from selected Federal and other agencies, outstanding at close of year, 1917–1931*

End of year	Farm mortgage loans [1] by—				Federal intermediate credit bank loans to—	
	Federal land banks [2]	Joint-stock land banks [2]	Loans of 40 life insurance companies [3]	Member banks [4]	Cooperative associations [2]	Financing agencies [2]
	Million dollars	*Million dollars*	*Million dollars*	*Million dollars*	*Thousand dollars*	*Thousand dollars*
1917	[5] 30					
1918	156	8				
1919	294	60				
1920	350	78				
1921	433	85				
1922	639	219				
1923	800	393	1, 335		33, 627	9, 105
1924	928	446	1, 452		43, 507	18, 760
1925	1, 006	546	1, 523		53, 780	26, 272
1926	1, 078	632	1, 588	[6] 489	52, 704	39, 730
1927	1, 156	667	1, 618	[6] 478	31, 991	43, 924
1928	1, 194	605	1, 606	[6] 444	36, 174	45, 103
1929	1, 197	585	1, 591	388	26, 073	50, 018
1930	1, 187	553	1, 554	387	64, 377	65, 633
1931	1, 163	530			45, 255	74, 613

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[1] See table for total mortgage debt, by States.
[2] Federal Farm Loan Board. Beginning 1928 loans from joint-stock land banks in receivership not included.
[3] Association of Life Insurance Presidents. Reports cover operations of 40 companies representing 82 per cent of the admitted assets of all legal reserve life companies in the United States
[4] Federal Reserve Board.
[5] Nov. 30.
[6] June 30.

TABLE 482.—*Selected interest and discount rates, and bond yields, 1917–1931*

Year	12 Federal land banks' rates to borrowers [1]	12 Federal intermediate credit banks' loan and discount rates [1]		Yield on Federal land bank bonds	Rates on commercial paper (4–6 months) (average) [2]	Federal reserve bank discount rates (New York) [2]
		Loans	Discounts			
	Average	*Average*	*Average*	*Average*	*Average*	*Range*
1917	5. 05			4. 33	4. 74	4 –4½
1918	5. 45			4. 39	5. 86	4½–4¾
1919	5. 50			4. 22	5. 42	4¾
1920	5. 50			5. 14	7. 46	4¾–7
1921	5. 88			5. 11	6. 56	4½–7
1922	5. 71			4. 50	4. 48	4 –4½
1923	5. 50	5. 50	5. 50	4. 39	5. 01	4 –4½
1924	5. 50	5. 12	5. 33	4. 55	3. 87	3 –4½
1925	5. 46	4. 59	5. 04	4. 34	4. 03	3 –3½
1926	5. 30	4. 70	4. 90	4. 27	4. 34	3½–4
1927	5. 11	4. 51	4. 73	4. 08	4. 10	3½–4
1928	5. 05	4. 81	4. 91	4. 26	4. 85	3½–5
1929	5. 32	5. 56	5. 61	4. 78	5. 84	4½–6
1930	5. 63	4. 53	4. 54	4. 70	3. 58	2½–4½
1931	5. 63	4. 08	4. 08	5. 34	2. 63	1½–3½

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[1] Federal Farm Loan Board. [2] Federal Reserve Board.

TABLE 483.—*Temperature: Normal*[1] *and 1931, by months, at selected points in the United States*

Station	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Normal	1931	Normal	1931	Normal	1931	Normal	1931	Normal	1931	Normal	1931	Normal	1931	Normal	1931	Normal	1931	Normal	1931	Normal	1931	Normal	1931	Normal	1931
	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.
Greenville, Me	12.2	13.8	13.0	18.0	24.8	30.2	36.5	40.7	49.4	52.8	58.6	60.4	65.2	67.7	62.2	62.4	52.0	56.0	45.8	47.5	31.2	38.0	18.4	21.6	39.0	42.4
Burlington, Vt	18.8	15.8	19.4	18.6	29.1	32.6	43.3	45.7	57.5	56.4	65.7	63.4	70.3	72.2	67.9	66.6	60.3	62.4	49.2	51.4	36.3	42.8	24.4	26.4	45.1	46.2
Boston, Mass	27.9	30.6	28.8	30.6	35.6	39.3	46.4	50.2	56.1	60.3	66.5	67.2	71.7	74.0	69.9	72.2	63.2	66.9	53.6	58.5	42.0	49.4	32.5	36.6	49.6	53.0
Buffalo, N. Y	24.6	25.6	24.3	27.1	31.1	32.5	42.8	45.2	54.6	55.6	64.4	65.9	69.8	72.3	68.6	70.2	62.4	66.4	51.9	55.6	39.4	47.9	29.8	35.6	47.0	50.0
Canton, N. Y	16.3	14.8	18.0	17.9	27.7	31.8	42.5	45.0	56.2	55.7	65.1	63.8	68.9	72.0	66.6	66.4	59.3	62.9	47.2	51.4	33.9	42.4	22.7	24.8	43.7	45.7
Trenton, N. J	30.5	33.2	30.7	34.4	39.1	39.7	49.8	50.8	61.1	61.8	69.5	70.4	74.5	77.5	73.0	74.0	66.9	71.4	55.6	59.6	44.4	51.1	34.4	40.5	52.5	55.4
Pittsburgh, Pa	30.7	33.2	32.3	34.6	39.6	36.4	51.2	50.6	62.4	60.8	70.7	70.0	74.6	77.0	72.9	73.0	66.4	70.3	55.7	57.4	43.2	51.6	34.2	41.5	52.8	45.7
Scranton, Pa	26.6	27.8	27.3	29.4	35.7	36.7	48.1	47.5	59.4	59.6	67.8	68.0	71.7	75.0	69.8	71.2	62.9	68.4	51.9	54.9	40.5	49.0	30.7	36.0	49.4	52.0
Cincinnati, Ohio	30.3	35.3	32.8	38.8	40.9	38.0	52.4	53.4	63.1	60.6	71.2	73.9	75.1	79.2	73.6	74.4	67.1	72.7	55.7	59.4	42.5	53.7	33.4	42.5	53.2	56.8
Cleveland, Ohio	26.5	31.6	27.4	33.0	34.6	33.9	46.2	47.4	57.9	57.5	67.1	68.6	71.4	76.3	70.0	72.3	63.9	69.8	53.6	58.5	40.9	51.2	31.2	40.2	49.2	53.4
Evansville, Ind	33.5	37.6	36.3	41.9	45.9	41.2	56.7	56.8	66.7	62.8	75.1	77.9	78.9	82.1	77.4	76.4	70.7	76.2	59.4	63.4	46.6	55.6	37.1	45.8	57.0	59.8
Indianapolis, Ind	28.4	33.4	31.1	38.0	40.0	36.5	52.1	52.7	62.9	59.4	71.6	75.0	75.7	79.7	73.7	74.6	66.9	72.8	55.7	59.4	42.3	51.7	32.2	41.2	52.7	56.2
Fort Wayne, Ind	26.4	31.4	26.0	34.6	38.2	34.0	48.6	50.0	60.2	57.1	69.0	72.1	73.7	77.6	71.3	73.0	65.2	70.5	53.6	57.5	40.7	49.2	28.5	38.2	50.1	53.8
Chicago, Ill	23.7	32.0	26.3	35.6	35.3	34.8	46.9	49.2	57.5	55.6	67.3	71.8	72.5	76.4	71.6	73.2	65.2	71.2	54.0	58.8	40.1	50.0	28.8	38.4	49.1	53.9
Peoria, Ill	23.1	32.6	25.9	36.7	37.0	36.7	50.9	52.6	61.7	58.2	70.9	75.7	75.4	79.2	72.5	74.0	64.3	73.0	52.0	59.2	37.5	50.2	28.1	38.6	49.9	55.6
Cairo, Ill	34.9	39.0	38.5	43.8	47.2	43.4	58.1	58.8	68.4	64.0	76.3	79.2	79.6	80.9	77.8	76.2	71.5	77.0	60.4	65.0	47.3	56.6	37.8	47.8	58.2	61.0
Grand Rapids, Mich	24.5	28.7	23.7	32.2	33.4	33.6	47.0	48.6	58.0	56.0	67.8	71.2	72.3	75.8	69.7	72.4	62.7	69.0	51.2	55.8	38.4	47.6	28.5	35.8	48.1	52.2
Alpena, Mich	19.1	23.0	18.0	26.0	25.5	28.2	38.6	40.7	50.5	52.0	60.4	61.6	65.9	70.2	64.1	66.4	57.6	63.8	47.1	52.6	34.4	43.6	24.8	31.2	42.2	46.6
Marquette, Mich	16.3	23.6	16.3	27.6	24.8	29.3	37.8	41.0	49.0	50.0	58.9	62.6	64.9	69.8	63.8	65.4	57.5	64.5	46.7	53.9	33.3	42.3	22.6	31.6	41.0	46.8
Madison, Wis	16.7	26.1	19.1	31.4	30.6	31.7	45.4	48.0	57.6	54.9	67.2	71.4	72.1	75.8	69.8	70.8	62.4	68.4	50.3	54.9	35.2	44.8	22.8	33.0	45.8	50.9
Green Bay, Wis	15.7	24.2	17.4	29.0	28.6	31.0	43.2	45.4	54.9	54.4	64.9	69.2	70.0	75.0	67.7	68.2	60.4	67.2	48.5	53.8	34.0	43.2	22.3	32.0	44.0	49.4
Duluth, Minn	7.9	19.8	11.4	26.2	23.7	27.5	37.0	42.0	47.3	50.4	57.2	60.0	63.9	68.5	62.6	63.9	55.1	61.4	44.1	50.9	30.0	36.2	15.9	26.6	38.0	44.4
St. Paul, Minn	12.6	25.3	15.8	31.4	29.1	31.6	45.6	49.6	57.9	56.2	67.1	73.4	72.1	76.2	69.4	70.5	61.3	68.2	48.6	54.2	32.5	40.3	19.0	29.8	44.2	50.6
Des Moines, Iowa	20.1	30.3	23.7	36.8	35.9	36.0	50.1	52.2	61.3	59.2	70.6	76.4	75.4	78.6	73.1	72.6	65.6	72.4	53.4	58.6	38.4	45.0	26.0	35.8	49.5	54.5
Dubuque, Iowa	19.1	28.6	22.2	34.3	34.0	34.4	48.6	51.0	60.3	56.8	69.4	75.1	74.1	78.1	71.7	73.1	64.0	70.0	51.9	56.8	37.0	45.8	24.7	35.2	48.1	53.3
St. Louis, Mo	31.1	37.8	34.8	41.7	44.1	40.6	56.1	57.3	67.0	62.8	75.0	79.6	78.8	82.2	77.5	77.2	70.5	76.9	58.8	62.9	45.4	54.8	34.9	45.2	56.2	59.9
St. Joseph, Mo	27.1	35.8	31.1	40.1	42.7	38.0	53.9	54.2	64.0	60.8	73.6	78.7	78.6	80.6	76.7	75.2	68.7	76.2	56.7	60.8	43.6	49.0	30.3	40.0	53.9	57.4
Springfield, Mo	33.5	38.1	35.2	43.2	45.2	40.8	56.0	54.2	64.5	59.8	72.5	76.4	76.8	79.3	75.7	73.0	68.9	75.2	58.2	62.6	43.2	54.3	36.2	44.8	55.7	58.5
Bismarck, N. Dak	7.8	24.6	10.3	30.4	24.2	27.2	42.1	45.6	54.5	54.4	63.7	69.6	69.8	71.6	67.3	67.5	58.1	63.2	44.9	48.6	28.5	31.1	14.7	21.4	40.5	46.3
Devils Lake, N. Dak	1.8	16.6	5.1	25.6	19.8	23.9	38.8	42.4	52.6	51.4	61.9	66.8	67.4	69.3	64.8	66.2	55.9	60.4	42.4	47.0	24.5	29.9	9.5	20.0	37.0	43.3
Pierre, S. Dak	16.0	30.6	18.6	35.8	31.5	32.6	46.8	49.9	58.0	57.2	68.5	76.9	75.3	79.6	72.8	75.2	63.8	70.2	49.8	53.6	33.6	35.4	21.8	24.8	46.4	51.8
North Platte, Nebr	22.9	33.3	26.6	38.6	36.6	34.6	48.6	49.7	58.7	58.1	67.5	75.5	72.9	77.6	70.8	73.8	62.1	71.0	49.7	55.0	36.6	37.4	26.7	28.6	48.3	52.8
Omaha, Nebr	21.9	33.8	25.5	38.6	37.0	36.4	51.2	53.2	62.4	59.8	71.6	79.0	76.7	80.4	74.4	75.4	66.8	73.7	54.3	59.2	38.5	44.6	26.4	37.0	50.6	55.9
Concordia, Kans	26.4	35.9	29.8	39.8	41.0	37.0	53.5	53.2	63.2	60.0	73.0	79.0	78.0	81.1	76.5	75.4	68.3	77.6	55.9	60.4	41.4	45.0	30.7	38.9	53.1	56.9
Dodge City, Kans	29.0	37.5	33.2	42.6	42.8	37.9	53.6	51.6	63.5	59.5	72.5	77.4	78.4	79.6	77.7	76.2	69.4	77.8	56.1	61.0	42.6	44.4	32.6	38.8	54.3	57.0
Iola, Kans	29.8	37.8	33.2	42.7	44.5	40.8	56.2	54.4	65.2	61.3	74.1	77.8	78.2	81.2	77.1	76.6	69.8	79.0	57.8	63.7	44.1	51.4	33.9	42.4	55.3	59.1
Washington, D. C	33.4	37.0	35.3	39.4	42.6	41.3	53.3	54.2	63.7	65.1	72.2	73.3	76.8	79.6	75.0	75.6	68.1	74.1	57.4	61.2	45.2	54.0	36.6	44.2	55.0	58.2
Lynchburg, Va	37.5	40.5	40.3	42.0	47.3	42.2	57.3	55.0	67.3	65.0	74.6	74.5	77.5	80.2	75.6	74.6	69.0	73.8	58.5	61.0	47.2	54.9	39.5	47.3	57.6	59.2
Norfolk, Va	40.6	42.4	42.7	43.8	48.2	44.2	56.8	56.0	66.2	66.0	74.4	73.8	78.7	80.6	77.4	77.8	71.6	76.4	62.5	65.2	51.4	59.0	43.1	51.9	59.5	61.4
Parkersburg, W. Va	32.5	36.0	34.2	37.8	42.8	38.8	53.4	53.1	63.8	62.1	71.4	72.5	75.4	79.6	73.9	73.8	67.3	72.4	56.1	58.4	43.8	53.2	35.2	43.1	54.2	56.7
Lexington, Ky	32.9	35.6	35.4	39.3	43.7	37.8	54.3	54.0	64.3	61.2	72.2	74.8	75.9	79.4	74.5	74.2	68.5	73.4	57.4	60.8	44.8	54.8	35.8	44.4	55.0	57.5

Charlotte, N. C	41.2	42.4	43.9	46.2	50.4	46.5	59.8	58.5	68.9	67.2	75.5	77.8	78.4	82.5	77.1	77.2	71.5	77.0	61.7	65.0	50.6	58.8	43.0	50.6	60.2	62.5
Wilmington, N. C	46.5	47.0	47.9	49.4	53.3	50.1	62.0	60.6	70.8	68.7	76.8	75.8	79.1	81.8	77.6	78.5	73.1	76.8	65.3	67.0	56.0	61.4	49.1	56.4	63.1	64.5
Charleston, S. C	49.9	49.0	52.4	51.8	57.4	53.8	64.5	63.6	72.7	71.4	78.9	78.4	81.4	82.9	81.0	80.0	76.6	78.7	67.8	70.2	58.1	63.0	51.7	61.3	66.0	67.0
Greenville, S. C	40.3	44.1	43.3	46.8	49.9	46.8	58.6	59.4	67.2	66.2	74.1	78.7	76.9	81.5	75.8	76.8	70.6	77.1	60.2	65.8	49.6	59.0	42.2	51.2	59.1	62.8
Atlanta, Ga	42.6	43.4	45.3	47.6	52.0	46.7	61.0	59.6	69.9	66.6	76.0	79.3	78.1	81.0	77.0	77.0	72.4	77.5	63.0	66.0	52.1	59.8	44.7	51.4	61.2	63.0
Thomasville, Ga	51.0	50.8	55.0	54.6	60.2	56.0	66.7	64.8	74.0	72.4	79.5	81.2	81.8	83.0	81.0	79.2	76.8	79.4	68.2	71.3	58.5	64.9	52.5	63.6	67.1	68.4
Jacksonville, Fla	55.4	53.6	58.0	56.4	62.6	57.8	68.7	65.8	75.0	73.2	79.9	79.6	82.1	83.8	81.7	80.8	78.3	80.0	71.1	72.9	62.2	66.4	56.3	67.6	69.3	69.8
Miami, Fla	66.5	63.8	67.1	65.5	70.2	65.2	72.8	71.3	76.4	77.0	80.0	80.5	81.0	82.8	81.4	83.0	80.1	81.2	77.0	78.2	71.8	73.4	68.0	75.4	74.4	74.8
Memphis, Tenn	40.9	43.6	44.3	48.3	52.3	47.1	61.8	61.3	70.6	66.4	77.6	80.6	80.7	80.6	79.4	77.4	73.6	79.8	63.3	69.0	51.7	58.8	43.6	51.6	61.6	63.7
Nashville, Tenn	38.6	40.8	41.6	44.3	49.2	44.2	59.0	58.4	68.2	64.8	75.6	77.7	79.1	81.6	77.8	76.4	71.8	77.2	61.0	65.2	49.0	57.8	41.0	50.2	59.3	61.6
Birmingham, Ala	45.1	45.4	48.0	49.7	55.4	49.0	63.3	61.4	71.1	67.6	77.9	80.8	80.2	81.8	79.2	77.8	74.8	81.0	64.8	69.4	53.9	62.3	46.4	54.3	63.3	65.0
Mobile, Ala	51.5	50.6	54.7	55.4	59.7	55.0	66.3	64.3	74.4	71.6	80.3	80.4	81.4	82.2	81.0	79.6	78.1	80.4	69.3	72.6	58.6	64.9	52.2	61.3	67.3	68.2
Meridian, Miss	47.0	46.2	49.6	51.0	57.1	51.0	64.0	61.8	71.3	68.6	78.1	79.2	80.4	80.6	79.5	77.8	74.5	79.2	64.3	68.8	54.2	61.6	47.7	55.9	64.0	65.1
Vicksburg, Miss	48.2	48.4	51.8	53.8	58.5	52.6	65.6	63.6	72.9	69.0	79.0	79.8	81.3	81.6	80.8	78.2	76.3	80.3	66.7	71.4	56.6	62.9	50.0	56.2	65.6	66.5
New Orleans, La	54.2	52.5	57.3	59.0	62.8	57.5	68.8	66.0	75.4	73.4	80.6	81.3	82.4	84.2	82.2	81.2	79.2	82.3	71.0	75.2	61.6	68.6	55.6	63.0	69.3	70.4
Shreveport, La	47.0	49.1	50.9	53.8	58.3	52.2	65.8	63.2	73.6	69.0	80.7	81.6	83.2	84.2	82.0	80.3	76.9	82.1	66.6	72.3	56.0	62.0	49.1	53.0	65.8	66.9
Amarillo, Tex	35.3	40.0	38.1	45.0	46.9	42.0	55.8	53.8	64.1	61.4	72.8	77.8	76.8	79.4	75.7	76.1	69.3	76.8	57.7	63.3	45.5	47.0	37.0	40.3	56.3	58.6
Brownsville, Tex	59.8	60.0	62.6	63.7	68.2	63.7	73.7	67.6	78.6	75.3	82.4	81.1	83.6	83.8	83.9	82.0	80.6	82.0	74.9	79.2	67.2	71.8	61.2	61.8	73.1	72.7
El Paso, Tex	45.0	44.0	49.0	50.0	55.8	54.6	63.4	62.6	71.5	72.3	79.6	81.8	81.1	83.2	79.2	79.5	73.9	79.2	63.5	70.0	52.7	54.0	44.9	43.8	63.3	64.6
Fort Worth, Tex	45.4	49.9	48.3	53.6	57.7	51.8	65.0	61.6	72.3	68.5	79.9	81.4	83.6	84.8	83.0	82.6	76.9	83.0	66.7	72.7	55.5	62.0	47.5	51.0	65.2	66.9
Galveston, Tex	53.8	54.0	56.3	58.8	62.4	56.0	68.7	64.4	74.8	71.8	80.7	80.5	83.4	84.2	83.0	82.2	80.1	82.4	72.7	76.6	63.3	69.2	56.4	57.4	69.6	69.8
San Antonio, Tex	52.3	52.6	55.4	57.4	62.8	58.0	69.1	64.2	75.1	72.5	81.0	81.2	83.8	82.6	83.5	82.0	79.0	83.2	70.5	78.0	60.3	66.6	53.7	55.2	68.9	69.5
Oklahoma City, Okla	36.4	43.0	39.6	48.3	50.0	45.0	59.8	57.2	67.7	65.4	76.0	80.6	80.6	83.4	79.7	80.2	72.8	82.2	61.5	68.0	48.8	53.8	39.3	45.6	59.4	62.7
Little Rock, Ark	41.4	44.1	44.9	49.6	53.0	48.2	62.1	60.6	70.3	66.0	77.4	80.1	80.9	81.7	79.8	77.8	74.1	79.9	63.6	68.2	52.1	58.8	44.2	49.8	62.0	63.7
Havre, Mont	12.9	28.7	13.6	35.6	27.1	31.6	43.7	46.2	53.4	56.4	62.0	67.4	68.3	69.4	65.4	68.7	56.4	58.7	44.5	47.5	31.2	26.4	20.4	23.4	41.6	46.7
Miles City, Mont	14.5	31.0	16.8	36.3	28.6	34.0	44.7	48.4	56.7	7.9	66.0	72.5	72.9	75.2	71.5	73.5	61.2	64.4	46.5	49.4	30.9	31.8	21.0	22.1	44.3	49.7
Kalispell, Mont	20.4	27.8	23.3	27.9	32.9	35.7	43.6	44.5	51.4	54.6	57.7	61.0	64.1	67.2	62.8	67.0	53.5	54.8	43.5	44.2	32.4	27.2	24.9	25.5	42.5	44.8
Cheyenne, Wyo	25.5	30.8	27.3	32.2	33.1	29.8	40.9	40.8	50.3	48.6	60.4	65.6	66.7	70.0	65.6	66.6	57.0	61.8	44.8	47.4	34.8	32.8	28.5	32.6	44.6	46.6
Sheridan, Wyo	19.3	29.2	21.3	32.2	30.8	32.2	43.2	43.7	51.8	52.8	61.2	67.2	67.6	71.6	66.1	69.2	56.5	60.3	44.2	46.8	32.4	31.4	22.8	23.2	43.1	46.6
Pueblo, Colo	29.9	32.4	32.9	38.8	41.6	38.2	50.1	50.7	59.2	57.9	69.0	74.6	74.2	77.2	72.7	74.0	64.6	71.0	52.0	56.1	39.4	37.3	31.5	33.2	51.4	53.4
Grand Junction, Colo	24.0	27.6	32.9	39.2	43.6	40.2	52.4	53.6	61.1	60.6	71.4	75.7	77.7	80.9	75.4	77.2	66.2	69.0	52.8	56.4	39.9	36.6	27.5	20.8	52.0	53.2
Santa Fe, N. Mex	28.8	29.9	33.1	35.6	39.7	36.2	46.7	47.8	55.7	55.0	64.8	67.4	69.0	70.2	67.4	67.0	60.9	63.4	50.4	52.8	38.9	37.1	30.7	27.7	48.8	49.2
Roswell, N. Mex	39.2	40.0	42.5	45.4	51.3	47.5	60.6	56.7	69.4	65.0	76.3	77.4	78.9	79.0	76.6	75.5	70.3	76.2	59.5	63.3	48.1	48.7	41.2	37.5	59.5	59.4
Phoenix, Ariz	51.2	52.9	55.1	57.8	60.7	62.8	67.0	72.4	75.0	80.5	84.5	87.0	89.8	95.2	88.5	89.3	82.7	85.9	70.6	72.8	59.7	57.2	52.0	49.7	69.7	72.0
Modena, Utah	26.7	23.9	31.0	34.9	38.2	38.9	46.0	48.4	53.5	55.7	63.3	65.0	70.6	76.3	69.2	71.8	60.0	60.8	48.0	50.6	36.4	30.7	28.1	19.0	47.6	48.0
Salt Lake City, Utah	29.2	24.1	33.8	34.0	41.7	41.4	49.6	51.7	57.4	59.8	67.4	73.6	75.7	80.8	74.5	76.6	64.4	65.6	52.5	56.6	41.1	36.2	31.9	27.9	51.6	52.4
Winnemucca, Nev	28.6	31.4	33.5	37.2	40.0	40.8	46.7	49.0	53.9	58.8	62.8	67.0	70.6	77.2	69.3	73.2	59.2	58.8	48.3	51.8	38.4	32.6	30.0	26.9	48.4	50.4
Boise, Idaho	29.8	30.2	34.8	36.2	42.7	43.4	50.4	50.6	57.1	61.4	65.3	68.2	72.9	77.4	71.8	75.1	61.9	62.5	51.1	53.8	41.0	36.7	32.1	28.6	50.9	52.0
Seattle, Wash	39.5	45.7	41.1	44.4	44.9	47.1	49.4	52.6	54.5	58.5	59.0	59.6	63.1	65.2	63.1	64.2	58.1	59.2	51.4	52.5	45.6	43.2	41.7	41.8	51.0	52.8
Walla Walla, Wash	32.7	38.4	37.1	39.0	46.1	46.6	53.1	53.9	59.6	64.7	66.5	67.2	74.0	76.9	72.7	75.4	63.8	65.2	53.5	54.0	42.8	38.8	35.5	33.1	53.1	54.4
Portland, Oreg	39.4	44.7	42.1	45.0	46.9	48.8	51.8	55.6	56.9	62.7	62.4	63.6	66.7	70.1	66.7	69.2	61.7	62.8	54.2	55.8	46.8	44.0	41.2	40.2	53.1	55.2
Roseburg, Oreg	41.2	44.8	43.4	44.5	47.1	48.8	51.0	54.2	56.0	61.2	62.5	62.2	67.4	69.6	68.0	68.0	62.9	61.9	53.9	54.7	45.9	43.2	41.8	42.3	53.4	54.6
Eureka, Calif	46.9	49.8	47.2	49.8	48.3	51.1	49.9	52.2	52.0	54.5	54.3	57.3	55.5	56.6	56.0	55.3	55.9	55.6	53.6	53.6	51.1	47.0	48.2	47.3	51.6	52.5
Fresno, Calif	46.2	48.8	51.1	54.2	55.0	58.6	60.2	66.2	67.1	73.6	75.8	73.8	82.1	87.6	80.7	84.4	73.4	72.2	64.0	65.5	54.2	52.8	46.2	46.7	63.0	65.4
Los Angeles, Calif	54.6	60.2	55.5	60.7	57.5	66.0	59.4	66.0	62.2	67.5	66.4	70.5	70.2	77.2	71.1	76.1	69.0	71.5	65.3	68.8	60.9	58.7	56.6	55.0	62.4	66.5
Sacramento, Calif	45.8	47.4	50.1	53.4	54.3	57.7	58.1	63.5	63.3	69.6	69.4	69.8	73.2	79.5	72.9	74.6	69.3	67.6	62.9	62.0	53.6	50.6	46.2	----	59.9	----
San Diego, Calif	54.3	57.7	55.1	59.2	56.7	61.9	58.5	63.8	60.8	66.2	63.9	68.7	67.2	73.6	68.7	73.8	67.1	69.7	63.7	66.6	59.7	57.6	56.0	53.8	61.0	64.4
San Francisco, Calif	49.9	52.3	52.2	56.7	54.2	59.0	55.0	59.0	56.8	61.8	58.5	62.0	58.5	62.3	59.1	60.4	60.9	62.8	60.5	59.8	56.3	54.4	51.3	49.3	56.1	58.3

Weather Bureau.

[1] Normals are based on records of 30 or more years of observations.

TABLE 484.—*Precipitation: Normal*[1] *and 1931, by months, at selected points in the United States*

Station	January Normal	January 1931	February Normal	February 1931	March Normal	March 1931	April Normal	April 1931	May Normal	May 1931	June Normal	June 1931	July Normal	July 1931	August Normal	August 1931	September Normal	September 1931	October Normal	October 1931	November Normal	November 1931	December Normal	December 1931	Annual Normal	Annual 1931
	Ins.	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*
Greenville, Me	2. 81	2. 97	2. 88	1. 84	3. 12	2. 26	2. 95	2. 42	3. 43	4. 02	3. 93	4. 75	4. 72	7. 20	3. 63	3. 77	4. 08	3. 93	3. 91	3. 87	3. 46	1. 10	3. 17	3. 40	42. 09	41. 53
Burlington, Vt	1. 76	2. 49	1. 57	1. 94	2. 04	1. 82	2. 15	2. 24	2. 85	2. 20	3. 38	2. 46	3. 50	6. 91	3. 37	1. 84	3. 48	3. 86	2. 97	2. 52	2. 66	1. 59	1. 88	2. 17	31. 61	32. 04
Boston, Mass	3. 61	4. 09	3. 37	4. 21	3. 57	4. 66	3. 34	3. 12	3. 18	4. 51	2. 89	9. 13	3. 49	2. 43	3. 62	4. 45	3. 14	1. 67	3. 15	2. 18	3. 33	. 82	3. 45	2. 90	40. 14	44. 17
Buffalo, N. Y	3. 30	2. 99	2. 95	1. 50	2. 57	3. 30	2. 56	2. 54	3. 10	2. 74	2. 82	2. 46	3. 03	3. 24	3. 08	2. 58	2. 92	4. 10	3. 29	1. 97	3. 02	1. 71	3. 36	2. 08	36. 00	31. 21
Canton, N. Y	2. 50	2. 18	2. 27	1. 15	2. 50	. 86	2. 18	2. 42	3. 00	3. 53	3. 29	2. 67	3. 50	4. 91	3. 65	1. 51	3. 35	5. 69	3. 03	2. 55	3. 16	2. 12	2. 69	2. 85	35. 12	32. 44
Trenton, N. J	3. 31	2. 15	3. 27	2. 08	3. 40	3. 24	2. 94	2. 07	3. 08	4. 00	3. 09	4. 28	3. 94	5. 47	4. 75	6. 39	3. 40	1. 06	2. 78	2. 22	2. 73	. 94	3. 35	2. 36	40. 04	36. 26
Pittsburgh, Pa	3. 05	1. 16	2. 62	1. 93	3. 03	2. 48	2. 92	3. 61	3. 21	5. 46	3. 81	5. 72	4. 05	5. 36	3. 23	3. 50	2. 58	3. 81	2. 52	1. 21	2. 29	1. 80	2. 86	2. 94	36. 17	38. 98
Scranton, Pa	3. 03	1. 37	3. 04	1. 45	3. 20	2. 20	2. 77	2. 30	3. 27	4. 03	3. 67	3. 04	4. 03	8. 74	3. 69	1. 90	3. 17	2. 09	3. 03	1. 45	2. 77	. 62	3. 02	1. 35	38. 69	30. 54
Cincinnati, Ohio	3. 48	. 97	2. 99	1. 88	3. 89	1. 97	3. 12	3. 93	3. 70	4. 47	3. 66	3. 30	3. 31	5. 22	3. 41	4. 24	2. 65	4. 71	2. 51	1. 89	2. 85	3. 01	2. 98	3. 35	38. 55	38. 94
Cleveland, Ohio	2. 51	1. 47	2. 51	1. 29	2. 71	1. 51	2. 44	3. 46	3. 12	2. 36	3. 12	3. 51	3. 45	2. 17	2. 77	2. 75	3. 33	3. 93	2. 78	1. 76	2. 64	2. 48	2. 44	2. 65	33. 82	29. 34
Evansville, Ind	3. 74	. 62	3. 24	2. 33	4. 19	3. 55	3. 90	3. 10	3. 86	2. 37	4. 04	3. 55	3. 42	. 73	3. 36	6. 27	3. 31	4. 45	2. 82	1. 83	3. 74	4. 65	3. 54	4. 87	43. 16	38. 32
Indianapolis, Ind	2. 95	. 54	2. 73	1. 76	3. 93	2. 32	3. 62	3. 58	3. 89	2. 51	3. 62	2. 20	3. 34	2. 95	3. 31	4. 70	3. 40	3. 66	2. 78	3. 75	3. 35	3. 38	2. 98	4. 41	39. 90	35. 76
Fort Wayne, Ind	2. 33	. 67	2. 35	1. 36	3. 22	1. 96	3. 07	2. 67	3. 85	2. 00	3. 57	3. 04	3. 60	2. 56	3. 11	3. 97	3. 06	2. 08	2. 60	2. 42	2. 88	2. 64	2. 58	2. 88	36. 22	28. 25
Chicago, Ill	1. 90	. 57	2. 14	. 76	2. 58	3. 33	2. 78	1. 75	3. 54	5. 08	3. 30	4. 78	3. 33	2. 68	3. 21	5. 67	3. 14	5. 14	2. 53	2. 62	2. 37	4. 63	2. 04	2. 28	32. 86	39. 29
Peoria, Ill	1. 78	. 48	2. 01	. 83	2. 73	2. 50	3. 38	2. 23	4. 06	5. 14	3. 77	2. 29	3. 58	5. 91	3. 12	2. 49	4. 03	4. 92	2. 29	3. 15	2. 37	5. 55	1. 77	2. 26	34. 89	37. 75
Cairo, Ill	3. 76	1. 77	3. 13	3. 38	3. 75	4. 20	3. 72	4. 00	3. 71	2. 99	3. 83	3. 13	3. 07	1. 97	3. 02	7. 14	2. 89	1. 19	2. 76	2. 66	3. 68	5. 35	3. 40	4. 15	40. 72	41. 93
Grand Rapids, Mich	2. 35	1. 80	2. 24	. 79	2. 48	1. 94	2. 77	1. 75	3. 44	3. 23	3. 48	2. 49	2. 92	2. 58	2. 61	. 72	3. 53	4. 09	2. 81	3. 18	2. 77	3. 27	2. 57	2. 64	33. 97	28. 48
Alpena, Mich	1. 89	1. 29	1. 71	. 88	1. 99	2. 13	2. 24	1. 77	3. 05	2. 74	3. 30	2. 90	2. 76	1. 78	2. 86	1. 75	2. 98	4. 34	2. 71	2. 96	2. 60	3. 33	2. 08	2. 23	30. 17	28. 10
Marquette, Mich	2. 33	1. 70	1. 90	1. 51	2. 26	2. 61	2. 43	2. 08	2. 96	1. 65	3. 22	4. 12	3. 12	4. 65	2. 67	1. 03	3. 25	5. 66	2. 76	3. 15	2. 91	3. 33	2. 66	1. 09	32. 47	32. 58
Madison, Wis	1. 38	. 78	1. 50	. 40	2. 07	2. 35	2. 77	1. 97	3. 85	1. 74	3. 76	3. 05	3. 88	2. 10	3. 21	5. 19	3. 72	7. 17	2. 43	3. 11	1. 78	5. 48	1. 63	1. 64	31. 98	34. 98
Green Bay, Wis	1. 54	. 64	1. 56	. 64	2. 04	1. 71	2. 65	. 63	3. 52	1. 08	3. 70	3. 17	3. 46	3. 31	3. 18	2. 34	3. 52	5. 84	2. 54	3. 76	2. 16	3. 61	1. 71	1. 10	31. 58	27. 83
Duluth, Minn	. 97	. 29	1. 05	. 69	1. 54	1. 87	2. 06	1. 04	3. 25	4. 51	3. 91	4. 57	3. 76	2. 73	3. 18	4. 32	3. 31	3. 63	2. 31	2. 90	1. 45	3. 89	1. 15	. 32	27. 94	30. 76
St. Paul, Minn	. 92	. 13	. 92	. 72	1. 43	1. 56	2. 35	1. 47	3. 27	1. 08	4. 14	4. 07	3. 57	1. 54	3. 01	3. 45	3. 07	2. 56	2. 20	2. 31	1. 30	2. 94	1. 06	. 77	27. 24	22. 60
Des Moines, Iowa	1. 07	. 57	1. 12	. 09	1. 78	1. 52	2. 91	1. 55	4. 56	2. 68	4. 76	6. 14	3. 50	3. 60	3. 52	3. 66	3. 67	4. 44	2. 50	3. 54	1. 43	7. 10	1. 22	3. 72	32. 04	38. 61
Dubuque, Iowa	1. 30	. 79	1. 38	. 25	2. 03	2. 20	2. 85	1. 43	4. 22	2. 00	4. 31	2. 31	3. 94	2. 57	3. 24	2. 02	. 01	6. 67	2. 48	2. 92	1. 70	4. 86	1. 44	1. 51	32. 90	29. 53
St. Louis, Mo	2. 34	. 40	2. 56	1. 77	3. 38	2. 39	3. 81	3. 23	4. 34	3. 61	3. 82	1. 98	2. 98	4. 06	2. 99	3. 46	3. 46	5. 66	2. 72	2. 90	2. 83	4. 65	2. 21	3. 28	37. 44	37. 39
St. Joseph, Mo	1. 05	. 53	1. 38	. 81	2. 04	2. 44	3. 02	3. 56	4. 24	4. 13	4. 94	2. 42	3. 68	4. 05	3. 50	5. 27	3. 87	7. 88	2. 69	1. 92	1. 63	8. 35	. 97	3. 38	33. 01	44. 74
Springfield, Mo	2. 34	. 63	2. 35	3. 06	3. 39	2. 54	3. 86	3. 80	5. 19	3. 65	4. 68	. 84	4. 21	4. 08	4. 09	10. 68	3. 52	. 92	3. 05	2. 53	2. 79	4. 08	2. 31	1. 65	41. 78	38. 46
Bismarck, N. Dak	. 45	. 05	. 44	. 74	. 89	1. 26	1. 52	. 42	2. 32	1. 94	3. 35	1. 66	2. 24	3. 39	1. 82	1. 58	1. 23	2. 81	. 94	1. 19	. 57	. 25	. 57	. 53	16. 34	15. 82
Devils Lake, N. Dak	. 47	. 19	. 50	. 13	. 78	1. 10	1. 52	. 65	2. 03	1. 42	3. 56	2. 54	2. 57	3. 01	2. 48	3. 89	1. 63	2. 72	1. 25	2. 29	. 72	. 48	. 54	. 09	18. 05	18. 51
Pierre, S. Dak	. 46	. 24	. 46	. 13	. 86	2. 22	1. 81	. 40	2. 49	2. 11	2. 96	1. 45	2. 68	. 71	2. 09	. 44	1. 10	1. 43	. 82	. 41	. 47	. 54	. 50	. 88	16. 70	10. 96
North Platte, Nebr	. 39	. 03	. 53	. 76	. 86	1. 81	2. 06	1. 25	2. 78	. 47	3. 22	2. 65	2. 74	. 97	2. 39	. 58	1. 35	. 41	1. 07	. 34	. 47	. 59	. 53	. 15	18. 39	10. 01
Omaha, Nebr	. 70	. 38	. 89	. 03	1. 37	1. 15	2. 51	1. 22	3. 77	3. 26	4. 56	4. 96	3. 54	2. 10	3. 05	4. 43	3. 21	3. 74	2. 17	2. 61	1. 07	5. 07	. 93	3. 33	27. 77	32. 28
Concordia, Kans	. 61	. 10	. 88	1. 46	1. 23	1. 38	2. 36	3. 38	4. 18	3. 83	4. 41	. 58	3. 78	3. 04	2. 91	5. 18	2. 60	1. 96	1. 97	2. 50	. 99	2. 61	. 63	. 91	26. 55	26. 93
Dodge City, Kans	. 41	. 10	. 77	. 56	. 89	2. 83	1. 94	2. 10	2. 89	2. 14	3. 30	1. 46	3. 14	2. 00	2. 67	1. 52	1. 90	. 69	1. 30	. 56	. 73	1. 32	. 57	. 47	20. 51	15. 75
Iola, Kans	1. 32	1. 06	1. 67	1. 53	2. 62	2. 56	3. 49	3. 04	4. 70	3. 67	5. 47	3. 10	3. 75	1. 16	3. 49	3. 98	4. 93	1. 50	2. 99	2. 05	1. 83	8. 13	1. 39	. 68	37. 65	32. 46
Washington, D. C	3. 55	1. 56	3. 27	1. 36	3. 75	3. 50	3. 27	2. 87	3. 70	4. 84	4. 13	2. 12	4. 71	4. 23	4. 01	5. 92	3. 24	2. 79	2. 84	1. 28	2. 37	10. 1	3. 32	2. 03	42. 16	33. 51
Lynchburg, Va	3. 43	1. 48	3. 15	1. 81	3. 54	3. 75	2. 95	3. 11	3. 63	5. 93	3. 79	2. 43	4. 21	5. 37	3. 78	5. 16	3. 31	. 73	3. 15	. 67	2. 33	. 45	3. 26	2. 74	40. 53	33. 63
Norfolk, Va	3. 10	1. 57	3. 22	1. 70	3. 77	2. 74	3. 23	3. 24	3. 81	4. 62	4. 22	5. 13	5. 75	4. 56	5. 22	4. 25	3. 23	1. 45	3. 04	. 74	2. 16	. 29	3. 34	1. 71	44. 00	32. 00
Parkersburg, W. Va	3. 58	. 91	3. 13	2. 97	3. 49	2. 60	3. 19	4. 39	3. 38	4. 82	4. 00	4. 18	4. 29	5. 62	3. 51	4. 70	2. 76	3. 27	2. 48	2. 04	2. 57	1. 97	3. 03	3. 54	39. 41	38. 01
Lexington, Ky	4. 18	. 77	3. 62	3. 40	4. 32	3. 19	3. 50	4. 36	3. 81	1. 13	4. 05	1. 83	3. 65	8. 50	3. 45	2. 40	3. 07	2. 15	2. 59	4. 44	3. 34	2. 50	3. 77	5. 84	43. 35	40. 51

Charlotte, N. C.	4.00	2.37	4.18	1.93	4.17	4.41	3.31	2.60	3.63	6.53	4.22	.60	5.10	8.62	5.07	8.13	2.99	1.15	2.95	1.26	2.57	.42	3.86	11.24	46.05	49.26
Wilmington, N. C.	3.29	2.07	3.26	1.72	3.17	3.06	2.66	1.13	3.44	3.62	5.10	1.82	7.13	6.33	6.36	5.53	4.51	.12	3.27	.50	1.96	.15	2.78	2.64	46.93	28.69
Charleston, S. C.	3.02	2.37	2.98	1.67	3.02	2.88	2.53	.92	3.00	1.12	4.59	2.46	6.89	6.88	6.53	4.93	4.53	2.08	3.27	.71	2.14	.53	2.72	2.25	45.22	28.80
Greenville, S. C.	4.87	2.55	5.18	3.80	5.15	4.63	3.72	3.63	4.03	5.73	4.55	.78	5.36	4.38	5.50	4.46	3.68	2.62	3.12	1.06	3.18	1.02	4.84	12.56	53.18	47.22
Atlanta, Ga.	4.95	2.61	4.79	2.40	5.30	3.46	3.61	1.83	3.47	2.77	3.74	.39	4.65	5.34	4.45	2.44	2.99	1.32	2.59	1.05	3.03	.57	4.70	12.07	48.27	36.25
Thomasville, Ga.	4.10	3.12	4.46	2.68	4.09	3.73	3.34	1.31	2.63	4.05	5.45	2.06	6.70	6.55	5.75	6.89	4.88	2.08	2.96	.89	2.68	.01	4.31	7.81	52.35	41.18
Jacksonville, Fla.	2.80	3.36	2.97	1.49	2.91	4.69	2.38	3.41	4.02	5.93	5.33	2.97	6.71	2.20	5.81	4.86	7.35	.07	4.46	1.86	1.98	.97	3.02	2.57	49.74	34.38
Miami, Fla.	2.52	7.07	1.83	2.12	2.17	6.10	3.09	4.59	6.22	4.34	6.86	.07	5.42	2.63	6.17	5.02	8.34	19.70	8.44	5.66	2.91	2.08	1.69	1.49	55.66	60.87
Memphis, Tenn.	4.81	.98	4.36	4.85	5.26	3.23	4.78	1.29	4.19	2.30	3.55	1.09	3.18	4.37	3.36	2.25	2.80	.57	2.68	.79	4.24	6.31	4.51	10.19	47.72	38.22
Nashville, Tenn.	4.76	1.31	4.13	5.05	5.11	3.49	4.13	2.44	3.87	1.92	4.00	2.31	3.88	2.47	3.71	3.94	3.42	1.54	2.49	1.86	3.50	3.75	4.20	6.33	47.20	36.41
Birmingham, Ala.	5.52	2.15	5.06	1.68	5.70	2.78	4.81	4.39	3.95	2.72	4.46	.47	5.17	3.96	4.26	4.69	3.38	.14	2.42	2.05	3.31	2.78	5.14	8.33	53.18	36.14
Mobile, Ala.	4.85	5.43	5.33	2.71	5.98	6.35	4.63	3.21	4.32	3.63	5.43	.65	6.89	17.99	6.92	5.84	5.00	1.92	3.60	3.58	3.64	.80	5.02	9.18	61.61	61.29
Meridian, Miss.	5.32	2.66	5.45	2.47	5.23	3.73	4.78	3.86	4.32	2.67	4.55	3.47	4.89	8.14	4.54	8.79	2.96	.23	2.39	1.37	3.32	2.67	5.23	9.16	52.98	49.22
Vicksburg, Miss.	5.37	3.04	4.82	2.48	5.57	4.45	5.19	.67	4.32	3.29	3.99	3.30	4.53	4.08	3.46	2.99	2.87	.08	2.77	.88	3.71	4.21	5.33	8.76	51.93	38.23
New Orleans, La.	4.34	4.65	4.25	3.79	4.72	4.83	5.24	3.39	4.60	2.48	5.88	2.56	6.37	7.77	5.80	5.28	5.03	2.06	3.30	5.36	3.14	2.87	4.79	8.63	57.46	53.67
Shreveport, La.	3.93	3.58	3.29	3.32	4.11	3.34	4.63	5.26	4.22	1.17	3.50	1.28	3.56	1.66	2.70	3.96	2.80	.74	2.69	2.66	3.65	5.01	4.29	10.43	43.37	42.41
Amarillo, Tex.	.51	.31	.71	1.83	.71	1.69	1.83	1.57	2.70	3.11	2.84	.69	2.84	1.40	3.08	2.19	2.30	.51	1.66	.92	.92	2.89	.80	1.24	20.99	18.35
Brownsville, Tex.	1.50	4.56	1.21	.81	1.26	1.19	1.43	.57	2.27	.86	2.87	1.02	1.96	2.79	2.55	2.23	5.52	1.43	3.29	4.47	1.98	.88	1.56	1.85	27.40	22.66
El Paso, Tex.	.46	.83	.41	.89	.36	.38	.26	2.24	.33	.06	.58	1.34	1.99	.73	1.70	2.14	1.25	1.10	.80	.14	.50	.64	.52	.30	9.16	10.79
Fort Worth, Tex.	2.05	1.79	1.76	2.84	2.32	4.20	4.02	1.97	4.65	2.42	3.35	2.43	2.61	.44	2.62	3.38	2.49	1.25	2.81	3.39	2.58	2.78	1.87	2.73	33.13	29.62
Galveston, Tex.	3.41	5.58	2.83	4.23	2.68	2.01	3.06	2.26	3.42	3.14	4.37	1.74	3.71	1.02	4.28	4.23	5.57	.94	4.36	3.40	3.33	3.74	3.75	7.81	44.77	40.10
San Antonio, Tex.	1.46	5.86	1.65	2.68	1.84	2.06	3.19	2.28	3.20	1.36	2.46	3.10	2.17	3.09	2.42	.30	3.05	.01	2.23	.75	1.90	.72	1.61	2.79	27.18	25.00
Oklahoma City, Okla.	1.19	.70	1.11	1.48	1.98	3.06	3.29	4.45	4.88	1.18	3.67	1.34	2.86	.55	2.89	2.17	3.05	.43	2.86	1.83	1.87	9.62	1.50	1.08	31.15	27.89
Little Rock, Ark.	4.73	1.00	3.84	4.03	4.62	4.47	5.19	6.43	4.78	2.07	3.76	2.76	3.50	3.74	3.75	1.29	3.17	.64	2.71	1.76	4.19	8.30	4.14	9.14	48.38	45.63
Havre, Mont.	.73	.57	.50	.02	.51	.82	.99	.68	2.04	.21	2.86	1.33	1.87	3.25	1.22	.22	1.29	.47	.67	.02	.61	.57	.61	.34	13.90	8.50
Miles City, Mont.	.66	.05	.49	.47	.86	.34	1.12	.45	2.24	.59	2.66	1.35	1.54	.77	1.08	.17	1.04	.67	.90	.23	.57	.54	.63	.55	13.79	6.18
Kalispell, Mont.	1.57	.55	1.11	.27	.95	.93	.80	.25	1.46	.52	2.06	1.46	1.10	.70	.87	.01	1.24	2.89	1.06	.44	1.35	2.57	1.45	1.72	15.02	12.31
Cheyenne, Wyo.	.42	.16	.64	.74	1.02	1.16	1.99	1.72	2.43	1.57	1.61	1.60	2.10	.75	1.55	2.70	1.20	.75	.96	1.07	.52	.40	.55	.17	14.99	12.79
Sheridan, Wyo.	.85	.33	.70	.59	1.16	1.88	1.92	2.15	2.65	2.38	2.04	.91	1.22	1.43	.91	.14	1.27	2.08	1.07	1.78	.63	.67	.64	.19	15.06	14.53
Pueblo, Colo.	.31	.12	.47	1.11	.59	.41	1.31	1.02	1.60	2.58	1.36	.60	1.94	.86	1.82	.83	.75	.72	.66	.13	.36	.42	.50	.02	11.67	8.82
Grand Junction, Colo.	.60	.10	.58	.81	.76	.63	.83	1.34	.81	.44	.40	.26	.61	.74	1.17	.40	.92	1.87	.95	1.07	.57	1.31	.63	.42	8.83	9.39
Santa Fe, N. Mex.	.67	.25	.75	.73	.80	1.18	1.00	1.98	1.26	.46	1.08	.85	2.38	1.00	2.28	2.10	1.45	4.59	1.18	1.10	.68	1.16	.74	.50	14.27	15.90
Roswell, N. Mex.	.53	.42	.57	1.19	.74	.38	.89	4.54	1.09	.70	1.67	.93	2.26	.98	2.15	2.71	2.11	.02	1.42	.37	.85	.38	.66	1.80	14.94	14.42
Phoenix, Ariz.	.80	.02	.77	3.71	.68	.07	.40	.40	.12	T.	.07	.02	1.07	.02	.95	1.70	.75	.23	.47	.22	.70	3.18	1.00	.75	7.78	10.32
Modena, Utah	.85	.57	.95	.88	1.03	.59	.89	.54	.79	.72	.32	.18	1.08	.52	1.29	.46	.78	.39	.74	.87	.59	2.17	.83	.77	10.14	8.66
Salt Lake City, Utah	1.31	.72	1.51	.61	1.98	1.14	2.05	1.84	1.92	.58	.80	.33	.51	.61	.85	1.07	.98	.56	1.44	.57	1.35	1.95	1.43	1.42	16.13	11.40
Winnemucca, Nev.	1.03	.09	.91	.51	.96	.25	.84	.32	.88	.14	.72	.69	.21	.12	.29	.16	.41	.33	.62	.29	.68	.80	1.08	1.17	8.54	4.87
Boise, Idaho	1.73	.88	1.44	.84	1.35	2.49	1.18	.78	1.43	.01	.92	.12	.24	T.	.19	.05	.53	.60	1.24	.43	1.28	1.38	1.57	1.83	13.10	9.41
Seattle, Wash.	4.94	6.34	3.89	3.25	3.05	4.37	2.38	2.25	1.87	1.02	1.33	3.35	.63	.11	.70	.11	1.77	2.97	2.84	3.09	5.03	2.66	5.60	6.54	34.03	36.06
Walla Walla, Wash.	1.96	1.51	1.76	.90	1.61	3.70	1.51	.66	1.61	.37	1.12	2.01	.39	.11	.49	T.	.95	.98	1.53	1.51	2.02	2.38	2.06	2.84	17.01	16.97
Portland, Oreg.	6.60	4.30	5.36	2.40	3.91	8.12	2.87	2.40	2.19	1.09	1.52	3.13	.61	T.	.64	.04	1.98	2.10	3.12	4.32	6.10	6.38	6.72	8.40	41.62	42.68
Roseburg, Oreg.	5.31	3.38	4.49	1.80	3.28	3.58	2.27	1.37	1.93	.56	1.09	5.02	.32	.00	.34	T.	1.27	.57	2.61	3.34	4.66	4.51	5.34	6.60	32.91	30.73
Eureka, Calif.	7.11	4.09	6.48	2.39	5.23	3.35	3.33	1.61	1.80	.49	.72	1.33	.11	.01	.18	.01	1.01	.54	2.33	2.28	5.18	5.75	6.28	9.06	39.76	30.91
Fresno, Calif.	1.73	2.61	1.43	.67	1.58	.48	.95	.86	.44	1.22	.08	1.12	.01	T.	.01	T.	.21	.05	.57	T.	.93	1.76	1.45	3.36	9.39	12.13
Los Angeles, Calif.	3.10	3.90	3.07	3.25	2.78	T.	1.04	3.02	.45	.52	.08	.02	.01	.00	.02	.02	.17	.24	.68	.06	1.20	1.95	2.63	5.95	15.23	18.93
Sacramento, Calif.	3.72	2.50	3.02	1.35	2.57	1.14	1.51	.05	.77	.67	.15	.29	.00	T.	.00	T.	.38	T.	.92	.18	1.88	1.30	3.03	-----	17.95	-----
San Diego, Calif.	2.06	3.72	2.03	4.11	1.72	.06	.77	1.38	.35	.24	.05	.01	.03	T.	.04	.08	.08	T.	.54	.05	.76	1.95	1.87	3.56	10.30	15.16
San Francisco, Calif.	4.54	5.50	3.85	1.10	3.14	1.68	1.61	.31	.80	1.10	.18	.32	.02	T.	.01	.00	.45	T.	1.12	.08	2.35	2.93	3.95	9.24	22.02	22.86

Weather Bureau.
T.=Trace, indicates an amount too small to measure.

[1] Normals are based on records of 20 or more years of observations.

TABLE 485.—*Frost: Dates of killing frosts, with length of growing season*

Station	Date of last killing frost in spring, 1931	Date of first killing frost in fall, 1931	Averages and extremes for 30 to 51 years				
			Spring frosts		Fall frosts		Length of growing season between average dates of killing frosts
			Latest date of killing frost	Average date of last killing frost	Earliest date of killing frost	Average date of first killing frost	
							Days
Greenville, Me	May 18[1]	Oct. 7	June 23	May 30	Aug. 26	Sept. 14	107
Portland, Me	May 1	Oct. 19	June 20	May 14	Sept. 11	Oct. 18	157
Concord, N. H	May 18[1]	Oct. 11	June 5	May 7	Sept. 6	Sept. 30	146
Northfield, Vt	May 14	Oct. 19	June 20	May 22	Aug. 27	Sept. 19	120
Boston, Mass	Mar. 15[1]	Nov. 7	May 16	Apr. 14	Sept. 26	Oct. 24	193
Hartford, Conn	Apr. 12[1]	do	May 22	Apr. 23	Sept. 16	Oct. 13	173
Albany, N. Y	do	do	May 30	do	Sept. 15	Oct. 16	176
Buffalo, N. Y	Apr. 30	Nov. 6	May 21	Apr. 28	Oct. 3	Oct. 21	176
Canton, N. Y	May 1	Oct. 9	June 2	May 8	Sept. 11	Sept. 28	143
Setauket, N. Y	Mar. 23[1]		May 17	Apr. 16	Oct. 21	Nov. 10	208
Syracuse, N. Y	Apr. 12[1]	Nov. 7	May 5	Apr. 24	Sept. 21	Oct. 22	181
Atlantic City, N. J	Mar. 18[1]	do	Apr. 30	Apr. 11	Oct. 1	Nov. 5	208
Trenton, N. J	Mar. 22[1]	do	May 17	Apr. 20	Sept 22	Oct. 19	182
Erie, Pa	Apr. 12	Nov. 27	do	do	Oct. 9	Nov. 2	196
Harrisburg, Pa	Mar. 17[1]	Nov. 7	May 12	Apr. 10	Oct. 3	Oct. 27	200
Pittsburgh, Pa	May 4[1]	Oct. 19	May 29	Apr. 21	Sept. 19	Oct. 22	184
Scranton, Pa	May 1	Oct. 13	May 10	Apr. 20	Sept. 14	Oct. 13	176
Cincinnati, Ohio	Apr. 7	Nov. 5	Apr. 26	Apr. 14	Sept. 30	Oct. 25	194
Cleveland, Ohio	Apr. 27	Nov. 7	May 21	Apr. 15	Oct. 2	Nov. 2	201
Columbus, Ohio	Apr. 7[1]	Nov. 6	May 17	Apr. 17	Sept. 21	Oct. 18	184
Dayton, Ohio	Apr. 7	do	May 25	Apr. 19	Sept. 30	Oct. 20	184
Toledo, Ohio	Apr. 30	do	May 29	Apr. 22	Sept. 9	Oct. 18	179
Evansville, Ind	Mar. 12	Nov. 25	Apr. 26	Apr. 6	Sept. 30	Oct. 27	204
Fort Wayne, Ind	Apr. 28	Oct. 18	May 28	Apr. 18	Sept. 14	Oct. 17	182
Indianapolis, Ind	Apr. 2[1]	Nov. 6	May 25	Apr. 16	Sept. 21	Oct. 19	186
Cairo, Ill	Mar. 20	do	Apr. 30	Mar. 31	Sept. 30	Oct. 29	212
Chicago, Ill	Apr. 2[1]	Nov. 24	May 25	Apr. 18	Sept. 20	Oct. 18	183
Peoria, Ill	Apr. 6	Nov. 6	May 11	Apr. 15	Sept. 26	Oct. 19	187
Springfield, Ill	do	do	May 25	do	Sept. 25	do	187
Alpena, Mich	May 22	Oct. 9	June 9	May 13	Sept. 6	Sept. 30	140
Detroit, Mich	Apr. 27	Nov. 6	May 31	Apr. 30	Sept. 21	Oct. 14	167
Grand Haven, Mich	May 4	Oct. 18	May 28	May 1	Sept. 23	Oct. 17	169
Grand Rapids, Mich	May 3	Nov. 6	May 30	Apr. 28	do	do	172
Ludington, Mich	do	Nov. 24	June 17	May 2	Sept. 4	Oct. 21	172
Marquette, Mich	May 23[1]	Nov. 6	June 6	May 13	Aug. 23	Oct. 9	149
Green Bay, Wis	May 3	Oct. 18	May 30	May 5	Sept. 16	do	157
La Crosse, Wis	May 23	Oct. 17	May 24	Apr. 28	Sept. 10	Oct. 10	165
Madison, Wis	Apr. 30	Nov. 6	May 25	Apr. 25	Sept. 16	Oct. 17	175
Milwaukee, Wis	Apr. 23	do	May 29	Apr. 28	Sept. 25	Oct. 16	171
Duluth, Minn	May 7[1]	Nov. 2	June 14	May 7	Sept. 10	Oct. 4	150
Minneapolis, Minn	May 6[1]	Nov. 6	May 20	Apr. 26	Sept. 13	Oct. 10	167
Moorhead, Minn	May 22	Sept. 24	June 8	May 13	Aug. 25	Sept. 24	134
Charles City, Iowa	Apr. 27	Nov. 2	May 21	Apr. 30	Sept. 12	Oct. 7	160
Des Moines, Iowa	May 7	Nov. 4	May 31	Apr. 21	Sept. 13	Oct. 10	172
Dubuque, Iowa	Apr. 24	Nov. 6	May 21	Apr. 20	Sept. 21	Oct. 15	178
Keokuk, Iowa	May 7	do	May 5	Apr. 14	Sept. 18	Oct. 13	182
Columbia, Mo	Apr. 5	do	May 9	Apr. 12	do	Oct. 18	189
St. Joseph, Mo	Apr. 27	Nov. 1	Apr. 28	Apr. 11	Sept. 26	do	186
St. Louis, Mo	Mar. 28[1]	Nov. 25	May 22	Apr. 4	Sept. 30	Oct. 28	207
Springfield, Mo	Apr. 5[1]	do	May 19	Apr. 14	do	Oct. 21	190
Bismarck, N. Dak	May 20	Oct. 8	June 7	May 11	Aug. 23	Sept. 20	132
Devils Lake, N. Dak	May 22	Oct. 11	do	May 16	Aug. 8	Sept. 19	126
Williston, N. Dak	May 21	Oct. 8	June 16	May 15	Aug. 22	Sept. 20	128
Huron, S. Dak	May 22	Oct. 31[1]	June 21	May 10	Aug. 23	Sept. 23	136
Pierre, S. Dak	May 21	Oct. 31	May 19	Apr. 30	Sept. 12	Oct. 5	158
Rapid City, S. Dak	do	Oct. 30	May 24	May 4	Sept. 13	Sept. 29	148
Yankton, S. Dak	May 22	Nov. 1	May 27	May 1	Sept. 14	Oct. 6	158
North Platte, Nebr	May 21	Oct. 30	May 24	do	Sept. 10	Sept. 30	152
Omaha, Nebr	Apr. 26	Nov. 1	May 19	Apr. 15	Sept. 18	Oct. 13	181
Valentine, Nebr	May 21	Oct. 15	June 21	May 6	Sept. 12	Oct. 4	151
Concordia, Kans	Apr. 21[1]	Nov. 1	May 19	Apr. 17	Sept. 20	Oct. 17	182
Dodge City, Kans	Apr. 5	Oct. 31	May 27	Apr. 21	Sept. 23	Oct. 21	183
Iola, Kans	Apr. 22	Nov. 1	May 4	Apr. 7	Sept. 26	Oct. 23	199
Wichita, Kans	Apr. 5	Oct. 31	May 15	Apr. 10	Sept. 23	Oct. 25	198
Washington, D. C	Mar. 21	Nov. 7	May 12	Apr. 8	Oct. 2	Oct. 20	195
Lynchburg, Va	Mar. 21[1]	Nov. 3	May 7	Apr. 9	do	Oct. 27	201
Norfolk, Va	Mar. 13	Dec. 3	Apr. 26	Mar. 25	Oct. 11	Nov. 17	237
Richmond, Va	Mar. 21[1]	Nov. 3	do	Mar. 31	Oct. 12	Oct. 31	214
Wytheville, Va	Apr. 7[1]	Oct. 18	May 15	Apr. 15	Sept. 19	Oct. 13	181
Elkins, W. Va	May 4[1]	do	June 1	May 8	Sept. 20	Oct. 8	153
Parkersburg, W. Va	Apr. 8	Oct. 19	May 22	Apr. 16	Oct. 1	Oct. 16	183
Asheville, N. C	Mar. 18	do	May 10	Apr. 15	Oct. 3	Oct. 20	188
Charlotte, N. C	Mar. 17	Dec. 8	Apr. 26	Mar. 28	Oct. 8	Nov. 5	222
Raleigh, N. C	do	Dec. 3	do	Mar. 29	do	do	221
Wilmington, N. C	Mar. 19	Dec. 16	May 1	Mar. 23	Oct. 16	Nov. 13	235
Charleston, S. C	Jan. 16[1]	None.	Apr. 2	Feb. 20	Nov. 8	Dec. 10	293

[1] Temperature 32° F. or below.

TABLE 485.—*Frost: Dates of killing frosts, with length of growing season*—Continued

Station	Date of last killing frost in spring, 1931	Date of first killing frost in fall, 1931	Averages and extremes for 30 to 51 years: Spring frosts: Latest date of killing frost	Spring frosts: Average date of last killing frost	Fall frosts: Earliest date of killing frost	Fall frosts: Average date of first killing frost	Length of growing season between average dates of killing frosts
							Days
Columbia, S. C.	Mar. 5	Dec. 27	Apr. 17	Mar. 18	Oct. 30	Nov. 18	245
Greenville, S. C.	Mar. 12	Dec. 8	Apr. 24	Apr. 3	Oct. 10	Nov. 2	213
Atlanta, Ga.	Mar. 17	do.[1]	Apr. 17	Mar. 31	Oct. 11	Nov. 7	221
Augusta, Ga.	Feb. 15	Nov. 8	do.	Mar. 22	Oct. 21	Nov. 10	233
Macon, Ga.	Mar. 18	do.	Apr. 18	Mar. 14	Oct. 11	Nov. 14	245
Savannah, Ga.	Feb. 11	None	Apr. 13	Feb. 26	Oct. 25	Nov. 24	271
Thomasville, Ga.	Mar. 5	do.	Apr. 26	Mar. 14	Oct. 21	Nov. 20	251
Apalachicola, Fla.	Jan. 15[1]	do.	Mar. 23	Feb. 14	Nov. 13	Dec. 7	296
Avon Park, Fla.	None	do.	Mar. 4	Jan. 12	Nov. 14	Dec. 26	348
Jacksonville, Fla.	Jan. 15	do.	Apr. 10	Feb. 16	Nov. 12	Dec. 6	293
Miami, Fla.	None	do.	Mar. 3	(2)	Nov. 21	(2)	(2)
Tampa, Fla.	Jan. 15	do.	Apr. 7	Jan. 26	do.	Jan. 3[3]	342
Chattanooga, Tenn.	Mar. 10[1]	do.	May 14	Apr. 2	Sept. 30	Oct. 26	207
Knoxville, Tenn.	Mar. 18	Nov. 3	Apr. 26	do.	Oct. 1	Oct. 28	209
Memphis, Tenn.	Feb. 15	Dec. 2	Apr. 25	Mar. 22	Oct. 2	Nov. 3	226
Nashville, Tenn.	Mar. 18	Nov. 7	Apr. 24	Apr. 2	Oct. 8	Oct. 27	208
Birmingham, Ala.	Mar. 17	None	Apr. 20	Mar. 16	Oct. 21	Nov. 9	238
Mobile, Ala.	Jan. 15	do.	Apr. 6	Feb. 17	Oct. 31	Dec. 5	291
Montgomery, Ala.	Feb. 15[1]	do.	Apr. 5	Mar. 10	Oct. 21	Nov. 11	246
New Orleans, La.	Jan. 15[1]	do.	Mar. 27	Jan. 25	Nov. 11	Dec. 16	325
Shreveport, La.	Mar. 29	do.	Apr. 9	Mar. 6	Oct. 20	Nov. 10	249
Abilene, Tex.	Apr. 5	Nov. 27	Apr. 23	Mar. 21	Oct. 19	do.	234
Amarillo, Tex.	Apr. 21[1]	Nov. 22	May 23	Apr. 17	Sept. 22	Oct. 29	195
Brownsville, Tex.	None	None	Mar. 8	Jan. 28	Nov. 15	Dec. 22	328
Corpus Christi, Tex.	do.	do.	Mar. 19	Jan. 21	Nov. 29	Dec. 28	341
Del Rio, Tex.	Mar. 9	Dec. 17	Mar. 27	Feb. 28	Oct. 27	Nov. 17	262
El Paso, Tex.	Mar. 28	Nov. 15	Apr. 26	Mar. 14	do.	Nov. 15	246
Fort Worth, Tex.	do.[1]	Dec. 15	Apr. 9	Mar. 11	Oct. 22	Nov. 12	246
Galveston, Tex.	None	None	Mar. 19	Jan. 19	Nov. 16	Dec. 26	341
Palestine, Tex.	Mar. 28[1]	Dec. 18	Apr. 5	Mar. 13	Oct. 20	Nov. 13	245
San Antonio, Tex.	Mar. 7[1]	None	do.	Feb. 24	Oct. 30	Nov. 28	277
Taylor, Tex.	Mar. 28	Dec. 18	do.	Mar. 13	do.	Nov. 22	254
Oklahoma City, Okla.	Mar. 31[1]	Nov. 25	Apr. 30	Mar. 31	Oct. 7	Nov. 2	216
Fort Smith, Ark.	Mar. 29	Dec. 2	Apr. 17	Mar. 21	Oct. 9	Nov. 6	230
Little Rock, Ark.	Mar. 10	do.	Apr. 26	Mar. 18	Oct. 22	Nov. 14	241
Havre, Mont.	May 20[1]	Sept. 23	June 6	May 16	Aug. 25	Sept. 19	126
Helena, Mont.	May 19	do.	June 9	May 9	do.	Sept. 28	142
Kalispell, Mont.	May 21[1]	do.[1]	June 7	May 5	Sept. 6	Oct. 2	150
Miles City, Mont.	May 20	do.	May 31	do.	Sept. 7	do.	150
Cheyenne, Wyo.	May 22	Oct. 10[1]	June 13	May 20	Aug. 25	Sept. 19	122
Lander, Wyo.	do.	Sept. 25	June 18	May 19	Aug. 23	Sept. 18	122
Sheridan, Wyo.	May 20	Oct. 12	June 6	May 20	Aug. 25	Sept. 20	123
Yellowstone Park, Wyo.	May 21[1]	Sept. 23	June 22	May 21	do.	Sept. 16	118
Denver, Colo.	do.	Oct. 30	June 6	May 4	Sept. 12	Oct. 8	157
Grand Junction, Colo.	Apr. 4	Oct. 27	May 14	Apr. 16	Sept. 14	Oct. 19	186
Pueblo, Colo.	May 22[1]	Oct. 30	June 2	Apr. 27	Sept. 12	Oct. 8	164
Roswell, N. Mex.	Apr. 5[1]	do.	May 7	Apr. 12	Oct. 10	Oct. 27	198
Santa Fe, N. Mex.	May 11[1]	do.	May 23	Apr. 25	Sept. 25	Oct. 18	176
Flagstaff, Ariz.	May 27[1]	Sept. 21	June 17	May 31	Sept. 12	Sept. 24	116
Phoenix, Ariz.	Jan. 20[1]	Nov. 23	Mar. 31	Feb. 16	Nov. 5	Dec. 3	290
Tucson, Ariz.	Mar. 8[1]		Apr. 6	Mar. 11	Oct. 22	Nov. 9	243
Yuma, Ariz.	None	Nov. 23	Feb. 18	Jan. 2	Nov. 30	Dec. 25	357
Modena, Utah	May 21[1]	Sept. 24[1]	July 3	May 23	Sept. 5	Sept. 29	129
Salt Lake City, Utah	Apr. 4[1]	Oct. 27	June 18	Apr. 20	Sept. 22	Oct. 20	183
Reno, Nev.	Apr. 25[1]	Sept. 23[1]	June 13	May 13	Sept. 6	Oct. 3	143
Winnemucca, Nev.	May 19[1]	Sept. 24	June 22	May 16	Aug. 22	Sept. 26	133
Boise, Idaho	Apr. 20	Nov. 9	June 16	Apr. 27	Sept. 11	Oct. 12	168
Lewiston, Idaho	do.	Nov. 12	May 10	Apr. 5	Sept. 21	Oct. 25	203
Pocatello, Idaho	May 8	Oct. 30	June 1	May 1	Sept. 8	Oct. 6	158
Seattle, Wash.	Mar. 5	Nov. 21	May 10	Mar. 17	Oct. 18	Nov. 21	249
Spokane, Wash.	Apr. 3	Oct. 8	June 8	Apr. 14	Sept. 7	Oct. 13	182
Walla Walla, Wash.	Mar. 28	Nov. 12	May 9	Mar. 30	Sept. 24	Nov. 5	220
Baker, Oreg.	May 21	Sept. 23[1]	June 23	May 8	Aug. 30	Sept. 30	145
Portland, Oreg.	Feb. 22[1]	Nov. 21	May 2	Mar. 15	Oct. 13	Nov. 19	249
Roseburg, Oreg.	Mar. 26	do.	May 24	Apr. 14	Sept. 24	Nov. 12	212
Eureka, Calif.	None	Nov. 22	Apr. 7	Feb. 8	Nov. 11	Nov. 26	291
Fresno, Calif.	Jan. 19[1]	do.	Apr. 14	Feb. 22	Oct. 31	Dec. 2	283
Independence, Calif.	Mar. 27		May 24	Apr. 6	Sept. 24	Oct. 28	205
Los Angeles, Calif.	None	None	Feb. 17	(2)	Nov. 2	(2)	(2)
Red Bluff, Calif.	Jan. 19[1]	Dec. 12	May 9	Mar. 10	Nov. 8	Dec. 6	271
Sacramento, Calif.	Jan. 12[1]	Nov. 23	May 7	Feb. 19	Nov. 11	Nov. 29	283
San Bernardino, Calif.	Mar. 9[1]		Apr. 18	Mar. 8	Oct. 23	Nov. 22	259
San Diego, Calif.	None	None	Jan. 20	(2)	Dec. 26	(2)	(2)
San Francisco, Calif.	do.	Dec. 15	Mar. 27	Jan. 25	Dec. 4	Dec. 10	319

Weather Bureau.

[1] Temperature 32° F. or below. [2] Frosts do not occur every year. [3] Of year following

TABLE 486.—*Annual rainfall by States, 1881–1930*

YEARS 1881-1890

State	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890
Alabama	57.09	60.95	49.74	52.58	53.07	55.33	47.55	57.42	43.30	49.99
Arizona	11.68	11.75	11.49	16.66	7.12	12.93	12.20	12.95	13.59	16.80
Arkansas	42.32	72.97	59.41	62.05	37.55	42.96	41.89	48.94	45.78	65.33
California	21.46	20.22	16.60	36.61	19.52	19.63	14.63	18.51	30.89	22.49
Colorado	22.61	15.21	16.43	14.66	16.84	17.38	15.22	12.00	13.73	11.97
Florida	55.76	56.57	45.17	52.41	63.48	57.07	51.04	54.42	50.21	51.65
Georgia	52.88	53.45	47.21	49.82	58.50	48.08	49.48	58.07	53.90	49.78
Idaho	17.44	16.15	17.88	19.87	16.64	14.27	16.21	10.08	12.05	17.96
Illinois	43.71	47.98	47.24	43.09	39.41	34.48	32.38	37.80	35.55	38.65
Indiana	44.98	51.72	51.78	42.42	38.47	39.79	36.12	39.79	36.02	49.58
Iowa	44.16	33.40	34.54	35.59	32.23	24.70	26.31	31.44	24.95	29.48
Kansas	33.16	25.35	31.71	32.39	32.03	25.11	23.37	23.43	29.44	21.16
Kentucky	41.56	61.97	55.48	50.18	40.08	43.54	43.25	44.96	35.97	58.82
Louisiana	60.39	61.70	58.90	66.26	57.39	51.36	51.41	55.10	40.25	55.43
Maryland	41.68	42.26	42.24	42.84	39.91	49.20	37.68	44.92	59.77	45.62
Michigan	40.04	38.69	39.68	36.58	35.00	31.96	29.81	28.68	26.86	34.23
Minnesota	33.52	28.35	26.11	29.48	23.18	26.02	23.70	25.10	19.08	25.01
Mississippi	(56.00)	66.99	55.75	64.01	48.59	49.60	44.57	(50.00)	38.31	56.23
Missouri	39.28	39.96	41.63	40.45	39.94	38.91	32.77	41.22	37.91	35.71
Montana	16.00	12.54	13.50	17.87	14.15	11.98	15.98	15.03	9.24	10.78
Nebraska	30.91	23.51	30.74	24.00	25.98	23.71	22.99	22.86	22.64	17.18
Nevada	7.21	10.39	9.77	13.66	7.81	10.88	5.18	5.76	10.17	12.88
New Jersey	44.10	54.75	43.80	46.63	37.87	46.54	47.66	52.20	63.33	49.34
New Mexico	22.57	12.57	11.30	15.23	12.43	16.56	13.48	17.97	10.74	13.10
New York	35.44	35.48	35.33	35.23	37.89	37.47	36.28	43.88	47.57	49.60
North Carolina	50.81	59.73	58.23	54.42	53.73	53.06	52.09	54.98	50.76	46.49
North Dakota	18.73	21.12	16.76	20.91	17.50	16.49	19.57	16.40	11.30	17.12
Ohio	52.53	45.03	44.93	36.19	38.06	36.71	33.63	39.64	33.41	50.33
Oklahoma	(30.00)	(50.00)	(35.00)	38.39	36.36	(25.00)	27.29	23.40	30.24	38.42
Oregon	34.48	30.40	22.68	28.84	25.57	24.70	30.05	23.32	21.80	22.24
Pennsylvania	39.29	45.45	43.57	45.94	40.98	42.63	43.10	45.91	52.67	51.28
South Carolina	(50.00)	(52.00)	43.54	49.94	52.04	46.27	(50.00)	54.63	46.76	42.29
South Dakota	23.62	20.56	24.90	19.93	22.00	22.12	23.46	17.61	19.85	16.43
Tennessee	50.35	65.77	56.32	55.57	44.36	51.75	44.97	48.29	45.50	57.60
Texas	32.23	30.76	28.78	34.53	29.95	26.25	29.71	38.40	34.80	31.37
Utah	9.57	9.67	7.72	15.15	13.00	13.48	6.55	13.62	10.41	9.00
Virginia	35.40	45.88	41.24	40.54	38.56	54.09	45.38	47.44	59.59	41.62
Washington	42.17	35.28	28.01	35.74	38.99	38.55	46.71	47.90	27.91	33.66
West Virginia	49.10	(60.00)	61.53	48.85	37.23	39.80	35.33	50.84	42.19	57.53
Wisconsin	46.38	37.15	35.38	40.86	34.48	33.74	32.66	31.02	27.04	37.04
Wyoming	11.88	(12.00)	19.24	15.54	16.12	7.16	8.80	15.22	10.81	12.76
New England	46.01	41.98	38.58	48.14	43.11	45.73	47.21	53.49	47.87	49.39
Mean (United States)	37.55	38.42	35.99	38.51	34.67	34.78	33.67	37.03	34.50	37.19

YEARS 1891-1900

State	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900
Alabama	52.85	56.81	50.11	47.42	49.92	45.25	47.30	49.09	47.84	66.16
Arizona	9.64	10.11	11.17	10.65	11.08	13.39	12.87	12.61	8.41	8.30
Arkansas	44.49	57.75	47.91	49.95	44.69	38.02	46.52	56.83	41.49	49.03
California	20.22	23.60	21.28	25.78	14.85	30.91	18.44	10.35	22.47	19.84
Colorado	19.88	15.56	12.86	14.37	18.33	15.07	19.46	14.61	14.67	14.43
Florida	48.14	47.99	53.01	52.51	45.50	49.62	56.69	48.36	53.93	61.19
Georgia	49.63	51.12	40.29	49.75	49.57	45.15	49.23	53.14	44.20	57.33
Idaho	16.29	17.51	19.98	20.64	13.26	21.24	19.72	14.22	17.87	16.12
Illinois	34.01	41.37	34.09	28.89	31.89	36.59	35.85	46.64	33.02	35.38
Indiana	40.05	41.83	41.54	32.21	30.99	40.62	40.44	45.71	34.97	37.83
Iowa	32.90	36.58	27.59	21.94	26.77	37.23	26.98	31.34	28.68	35.05
Kansas	31.14	29.02	20.25	20.72	28.08	28.72	24.45	31.79	26.26	27.96
Kentucky	49.69	44.25	44.71	34.81	38.47	44.68	46.72	52.38	46.38	44.40
Louisiana	51.55	61.67	50.18	50.94	54.56	46.36	51.60	63.60	42.29	65.40
Maryland and Delaware	50.20	39.39	38.76	38.24	34.47	37.11	44.97	42.11	40.84	36.66
Michigan	30.65	33.69	34.55	28.00	26.90	31.74	31.23	32.29	28.35	32.31
Minnesota	24.52	28.38	24.45	21.63	22.68	31.02	27.23	24.21	30.14	29.79
Mississippi	56.24	57.47	51.54	47.60	47.69	43.13	46.62	54.58	44.52	66.54
Missouri	38.04	42.76	38.19	33.18	39.30	44.63	38.82	53.67	37.32	38.34
Montana	18.03	14.32	13.88	15.28	12.97	17.50	15.71	16.82	15.28	13.34
Nebraska	30.62	24.12	16.80	13.30	18.70	26.17	23.54	20.70	19.51	24.46
Nevada	14.06	10.54	9.22	10.89	7.90	10.61	9.79	6.49	9.12	8.25
New Jersey	47.98	42.04	47.90	47.37	37.29	42.51	51.72	52.35	45.84	42.71
New Mexico	14.84	9.51	12.40	10.47	15.36	13.23	16.52	14.03	10.98	13.52
New York	38.13	43.77	42.34	38.73	33.35	39.13	40.30	43.56	34.18	38.03
North Carolina	54.55	47.04	52.66	46.57	50.23	47.54	46.06	50.04	52.08	48.40
North Dakota	22.25	18.34	15.91	15.64	17.32	23.57	15.88	15.17	17.67	18.96
Ohio	38.61	37.16	30.63	29.75	28.46	39.58	38.50	43.78	34.32	32.82
Oklahoma	22.31	35.79	25.49	25.57	35.08	23.78	30.61	36.44	36.99	32.50
Oregon	29.16	27.87	29.57	32.52	25.17	33.13	28.60	21.02	31.06	24.57
Pennsylvania	45.65	41.30	44.26	43.69	33.51	41.95	42.73	45.49	40.93	37.31
South Carolina	(50.00)	47.36	53.68	50.49	48.99	44.95	46.40	49.26	46.76	49.79
South Dakota	20.05	24.41	17.93	15.30	16.05	24.14	21.09	16.50	20.16	23.05
Tennessee	52.80	54.17	45.56	42.65	43.10	47.09	50.89	50.45	47.97	51.43

TABLE 486.—*Annual rainfall by States, 1881–1930*—Continued

YEARS 1891-1900—Continued

State	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900
Texas	30.45	29.40	20.47	27.65	32.92	27.41	27.32	28.43	28.70	42.17
Utah	14.36	9.50	11.56	11.43	10.66	12.20	14.55	10.61	12.10	8.38
Virginia	48.74	40.01	46.83	35.97	38.09	42.89	40.81	44.80	43.18	39.33
Washington	43.32	32.97	41.23	43.42	35.56	46.20	39.82	33.04	42.39	37.56
West Virginia	45.96	38.33	39.82	34.52	32.82	43.49	41.59	47.61	40.97	37.62
Wisconsin	26.14	34.95	29.80	27.14	23.14	31.21	27.75	28.07	29.83	34.65
Wyoming	14.90	15.44	9.86	12.14	17.71	15.27	13.24	13.07	13.58	10.95
New England	44.38	38.96	43.11	35.79	40.79	35.98	33.11	50.78	37.76	44.92
Mean (United States)	35.90	34.94	33.74	31.31	31.61	33.77	33.33	36.78	32.81	35.73

YEARS 1901-1910

State	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910
Alabama	55.61	49.27	49.96	39.21	55.03	55.93	54.98	48.01	58.32	45.20
Arizona	10.61	10.32	9.87	9.84	26.60	15.90	14.66	15.55	12.60	8.99
Arkansas	35.28	51.70	44.62	43.45	63.65	56.97	49.71	48.88	44.05	45.21
California	22.12	24.22	20.69	30.39	21.59	38.70	32.49	18.78	42.13	16.77
Colorado	14.14	13.88	13.80	16.30	18.09	19.71	16.33	17.09	20.96	14.35
Florida	58.47	51.24	55.79	48.15	61.43	53.76	49.15	48.54	49.52	50.88
Georgia	57.58	49.99	53.84	37.17	51.03	54.60	48.73	50.03	48.31	43.60
Idaho	15.40	16.51	16.60	14.70	15.68	20.69	20.47	16.46	22.18	17.08
Illinois	25.72	41.88	34.94	37.59	36.71	37.26	40.65	35.34	43.11	32.09
Indiana	30.56	40.06	36.73	38.22	43.18	39.62	44.83	34.30	48.32	37.53
Iowa	24.41	43.82	35.39	28.51	36.56	31.60	31.61	35.09	40.01	19.87
Kansas	21.35	34.42	31.35	31.01	30.77	28.58	26.46	32.30	31.15	19.67
Kentucky	35.65	44.35	41.16	35.10	47.68	48.84	47.76	41.94	51.36	50.67
Louisiana	50.60	46.32	49.92	44.18	76.57	48.42	60.00	58.89	56.02	49.08
Maryland and Delaware	45.08	49.20	46.94	36.49	43.84	48.01	48.86	40.01	37.47	37.42
Michigan	28.06	32.53	32.72	29.73	33.32	31.41	30.67	29.64	32.43	25.69
Minnesota	24.26	29.46	32.85	29.65	33.10	31.66	24.03	29.49	29.27	14.73
Mississippi	50.16	48.07	46.59	41.48	65.43	54.35	54.12	54.76	57.97	47.12
Missouri	25.28	44.96	40.15	41.62	45.43	37.34	41.81	42.56	45.16	36.86
Montana	15.08	15.26	15.03	11.04	14.38	18.47	17.00	20.09	19.57	15.99
Nebraska	22.76	29.09	27.27	23.37	31.65	26.98	20.52	26.94	25.55	17.18
Nevada	13.20	7.25	7.06	10.62	8.32	15.87	13.06	6.34	11.03	5.53
New Jersey	51.80	59.44	56.25	43.78	42.06	46.38	51.65	42.58	40.86	39.73
New Mexico	14.50	9.97	11.25	14.41	20.95	15.89	16.13	12.68	12.83	9.46
New York	43.30	42.95	43.27	38.63	39.02	37.48	38.45	33.10	36.03	37.26
North Carolina	62.66	44.46	50.13	43.27	51.94	59.53	48.64	57.79	47.78	48.42
North Dakota	19.48	19.34	19.25	19.02	19.96	19.72	14.41	18.64	17.73	12.19
Ohio	32.36	37.58	36.85	36.19	39.08	36.88	42.85	34.10	42.66	36.03
Oklahoma	22.70	40.54	29.41	29.88	39.76	36.93	33.71	50.54	26.86	19.24
Oregon	24.75	29.88	24.96	32.46	21.05	29.50	31.71	20.90	32.85	26.96
Pennsylvania	54.54	47.29	46.27	40.44	43.34	42.78	45.45	39.58	37.38	38.99
South Carolina	54.98	46.43	50.87	40.98	45.10	54.81	47.79	53.33	44.61	45.31
South Dakota	22.76	19.92	22.92	18.46	26.68	27.95	18.92	25.10	23.69	15.49
Tennessee	46.96	49.42	47.23	40.74	50.85	53.86	49.14	45.59	50.63	45.17
Texas	22.23	33.92	33.03	30.02	41.73	31.51	33.86	32.91	23.45	21.46
Utah	10.05	9.17	10.21	11.43	13.58	18.34	16.07	14.82	19.31	11.25
Virginia	50.17	51.42	44.85	36.18	43.58	49.56	44.19	45.21	39.81	41.37
Washington	35.30	42.13	32.92	31.57	31.63	35.71	32.02	32.23	35.77	33.26
West Virginia	44.78	42.19	40.55	33.33	45.53	44.36	52.15	40.47	43.02	38.60
Wisconsin	26.15	22.91	35.93	31.91	35.51	35.41	31.02	29.42	31.97	21.41
Wyoming	12.14	9.81	12.87	14.29	16.03	17.82	14.63	17.28	16.33	12.12
New England	47.79	45.95	42.08	39.90	37.34	41.54	41.82	35.48	39.84	35.13
Mean (United States)	34.24	36.30	34.97	31.97	37.24	37.39	36.17	34.24	35.92	30.11

YEARS 1911-1920

State	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Alabama	52.54	66.45	52.06	44.90	53.75	53.21	53.74	56.22	65.14	64.20
Arizona	15.35	12.64	12.02	16.86	15.50	17.06	12.83	14.74	19.19	13.25
Arkansas	44.53	45.83	54.01	42.85	53.08	42.18	40.72	44.64	54.52	54.28
California	29.39	22.27	25.20	31.13	33.82	34.84	16.48	24.47	21.29	26.71
Colorado	19.24	18.84	17.78	19.26	19.49	18.72	14.72	19.12	17.26	18.18
Florida	47.40	64.88	48.02	49.08	56.30	47.10	41.36	50.09	57.35	57.79
Georgia	48.23	63.02	46.47	45.58	49.63	43.50	47.41	48.73	54.91	59.73
Idaho	17.68	21.62	19.88	16.20	19.09	20.63	20.29	15.98	16.44	17.77
Illinois	38.95	35.55	35.40	28.99	41.90	37.17	32.54	37.94	37.56	32.80
Indiana	39.85	40.69	44.20	31.54	41.77	40.69	36.82	40.83	39.01	36.97
Iowa	31.37	28.65	29.95	31.93	39.53	28.90	27.81	32.78	36.76	31.75
Kansas	24.53	26.69	23.02	23.08	40.77	23.84	19.60	27.60	25.65	26.65
Kentucky	46.77	47.93	47.46	41.80	51.92	45.49	46.01	40.64	52.13	46.90
Louisiana	61.98	64.81	64.65	53.37	53.26	51.07	40.22	54.46	68.97	63.12
Maryland and Delaware	43.61	43.42	38.98	35.97	43.58	40.47	40.65	37.96	47.62	44.95
Michigan	34.26	32.34	29.79	30.02	30.75	33.97	27.21	29.47	30.23	29.10
Minnesota	29.10	22.45	25.49	28.46	28.42	28.27	20.99	24.98	27.56	25.25

TABLE 486.—*Annual rainfall by States, 1881–1930*—Continued

YEARS 1911–1920—Continued

State	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Mississippi	59.47	66.32	57.29	46.59	53.94	51.49	45.16	49.73	69.24	62.85
Missouri	38.94	38.68	37.47	34.72	49.62	40.33	31.94	37.16	40.05	37.17
Montana	18.50	17.39	15.28	15.06	18.71	18.72	14.44	13.78	11.14	14.59
Nebraska	21.68	21.81	21.97	20.78	35.60	19.08	20.80	22.36	25.48	24.92
Nevada	7.84	6.99	10.99	9.43	7.97	9.76	6.72	9.28	7.08	8.89
New Jersey	50.36	46.61	46.99	39.23	47.37	38.17	40.80	37.65	52.10	51.87
New Mexico	17.92	13.92	15.36	19.45	17.64	15.95	9.49	15.08	20.95	14.87
New York	36.61	38.34	39.66	36.39	40.91	38.03	38.73	38.23	39.69	40.57
North Carolina	42.65	47.27	52.37	47.09	50.09	50.91	49.85	50.98	48.80	56.67
North Dakota	19.40	20.34	14.69	19.16	19.42	20.50	10.92	16.02	15.76	15.34
Ohio	42.63	37.82	44.75	35.41	40.83	37.24	36.51	36.54	40.33	37.49
Oklahoma	28.93	28.60	33.07	25.72	45.41	29.47	22.39	33.55	34.91	36.35
Oregon	22.76	32.50	27.48	26.40	26.09	28.64	24.33	20.61	26.21	26.48
Pennsylvania	45.52	44.13	43.25	38.24	44.26	40.98	41.71	41.25	46.66	40.63
South Carolina	39.80	54.32	47.57	43.39	48.89	43.91	43.49	46.48	46.79	52.24
South Dakota	19.18	18.50	17.89	21.57	28.54	20.90	16.77	21.91	20.06	27.44
Tennessee	53.11	54.40	47.42	43.93	54.18	50.79	51.51	47.30	57.65	56.46
Texas	29.13	26.12	36.05	37.88	32.01	24.59	16.21	28.90	45.64	34.24
Utah	13.02	14.15	12.88	13.60	13.33	15.93	11.88	14.12	11.83	16.57
Virginia	41.50	39.19	42.75	37.17	39.72	39.36	40.82	44.43	41.66	46.30
Washington	25.97	34.15	30.42	32.19	34.43	33.93	33.80	30.12	31.00	32.64
West Virginia	47.13	43.78	49.02	39.71	43.76	44.63	44.33	44.77	47.27	41.62
Wisconsin	37.00	32.51	32.81	32.72	32.68	33.79	27.28	29.69	33.22	30.15
Wyoming	13.98	18.40	15.88	12.69	19.42	12.70	13.75	16.05	10.46	14.88
New England	38.15	42.15	39.77	34.78	40.34	40.79	38.93	38.76	43.06	48.66
Mean (United States)	34.70	36.30	35.01	32.08	37.42	34.26	31.20	33.60	37.30	37.49

YEARS 1921–1930

State	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	Mean
Alabama	45.34	58.78	60.87	47.23	45.20	60.79	45.48	55.51	76.48	46.17	53.11
Arizona	13.95	12.76	16.95	8.68	12.77	16.48	15.68	9.67	11.14	15.21	13.06
Arkansas	47.46	46.50	59.85	37.03	42.19	40.24	65.85	50.50	46.10	46.62	49.03
California	25.89	28.96	14.13	17.05	21.13	27.06	27.50	18.64	15.00	18.38	23.52
Colorado	19.38	15.60	21.23	13.75	16.96	16.98	20.32	17.05	18.16	17.33	16.79
Florida	45.24	57.53	50.17	61.62	52.64	59.58	40.71	60.12	59.04	60.24	52.94
Georgia	40.94	55.38	52.76	54.27	41.00	50.44	40.65	59.92	69.83	46.13	50.48
Idaho	18.34	15.45	18.07	12.46	18.86	16.37	22.88	13.60	13.06	16.35	17.24
Illinois	40.74	34.15	37.99	35.81	32.83	42.94	49.38	37.40	41.94	27.89	37.26
Indiana	45.80	38.76	42.86	37.73	34.59	43.73	49.19	36.76	47.04	29.70	40.17
Iowa	32.03	29.98	29.50	31.39	28.24	33.07	29.35	35.96	30.20	26.10	31.48
Kansas	24.19	29.01	31.88	24.23	25.08	24.80	32.40	33.40	27.96	26.87	27.48
Kentucky	49.42	44.43	53.92	42.68	41.11	49.95	53.43	45.61	48.46	27.86	45.81
Louisiana	47.99	66.44	71.21	38.47	52.48	65.98	59.51	56.06	63.65	53.01	55.74
Maryland and Delaware	37.72	40.15	40.27	46.26	34.91	43.90	40.37	45.09	42.46	23.78	41.89
Michigan	31.84	32.10	28.80	29.79	25.51	33.03	31.52	33.33	31.22	22.62	31.29
Minnesota	23.00	22.95	19.81	24.77	23.93	24.68	24.44	25.56	20.56	22.59	25.91
Mississippi	48.25	59.43	71.03	40.06	49.24	56.18	55.29	51.27	60.03	47.32	53.32
Missouri	43.77	39.49	41.23	40.01	39.78	43.07	53.86	45.59	46.61	31.27	40.09
Montana	14.64	15.12	18.12	13.71	16.34	13.79	20.63	13.06	13.08	12.38	15.21
Nebraska	21.30	20.41	28.02	21.06	20.89	21.07	23.50	22.31	23.09	25.63	23.51
Nevada	8.30	9.56	8.70	5.49	10.16	6.39	7.84	4.87	5.83	9.77	9.01
New Jersey	38.16	41.57	40.38	44.17	42.15	44.41	49.68	46.22	42.96	35.28	45.89
New Mexico	16.46	10.86	19.46	10.65	13.86	17.44	13.94	15.09	16.48	14.64	14.49
New York	35.41	39.53	35.46	36.98	41.41	40.19	45.50	39.03	43.02	32.18	39.02
North Carolina	42.92	56.88	45.11	54.57	37.33	43.33	44.95	56.21	62.09	38.04	50.44
North Dakota	19.59	19.75	17.76	17.55	16.81	15.70	21.52	18.40	14.32	14.90	17.68
Ohio	42.97	37.04	39.02	37.34	34.11	43.69	43.01	34.89	45.83	27.00	38.44
Oklahoma	30.02	33.89	44.98	27.86	28.31	39.04	39.55	36.48	35.39	30.70	32.24
Oregon	27.26	23.85	23.37	21.76	23.71	25.49	31.12	22.42	19.93	19.22	26.43
Pennsylvania	41.80	34.88	39.17	43.26	37.72	43.11	47.30	42.06	44.21	28.82	42.47
South Carolina	42.83	58.17	46.60	56.99	35.82	42.63	42.16	61.66	66.13	40.15	48.39
South Dakota	18.83	21.61	22.17	18.47	15.90	17.73	23.21	17.81	20.93	18.10	20.77
Tennessee	49.94	54.35	57.63	46.20	40.50	54.69	55.98	53.13	59.78	39.80	50.30
Texas	28.64	32.91	40.34	23.50	25.79	36.33	27.77	29.03	31.17	29.67	30.59
Utah	16.51	14.83	13.60	10.57	14.50	12.43	16.58	10.70	13.60	15.14	12.67
Virginia	34.94	44.72	40.84	47.41	32.55	41.60	41.95	42.99	45.92	24.86	42.55
Washington	36.33	24.67	29.64	27.70	28.09	32.12	42.02	31.93	23.67	27.28	34.70
West Virginia	45.45	41.57	46.03	47.84	41.20	49.60	48.90	43.40	46.70	25.20	43.84
Wisconsin	30.73	31.67	26.56	33.04	27.69	35.05	30.94	33.09	28.09	25.08	31.48
Wyoming	12.58	14.16	19.31	12.69	15.62	14.58	18.16	14.23	15.06	14.70	14.17
New England	37.51	42.99	40.84	35.61	41.00	39.58	45.45	40.48	40.08	33.47	41.53
Mean (United States)	33.22	35.49	36.37	32.26	31.58	35.86	37.58	35.37	36.73	28.81	38.74

Weather Bureau

TABLE 487.—*Production of lumber, by States, 1879, 1889, 1899, 1909, 1919, 1929, and 1930*

State	1879	1889	1899	1909	1919	1929	1930[1]
	M ft. b. m.	*M ft. b. m.*	*M ft. b. m.*	*M ft. b. m.*	*M ft. b. m.*	*M ft. b. m.*	*M ft. b. m.*
Alabama	251, 851	589, 480	1, 101, 386	1, 691, 001	1, 798, 746	2, 058, 964	1, 341, 624
Arizona	10, 715	5, 320	36, 182	62, 731	73, 655	174, 594	95, 497
Arkansas	172, 503	537, 884	1, 623, 987	2, 111, 300	1, 772, 157	1, 348, 318	869, 379
California	304, 795	517, 781	737, 035	1, 143, 507	1, 259, 363	[2] 2, 063, 229	[2] 1, 514, 263
Colorado	63, 792	79, 951	133, 746	141, 710	64, 864	71, 535	54, 688
Connecticut	64, 427	48, 957	108, 093	168, 371	86, 708	30, 157	26, 525
Delaware	31, 572	23, 466	35, 955	55, 440	27, 437	9, 641	8, 436
Florida	247, 627	411, 869	790, 373	1, 201, 734	1, 137, 432	1, 136, 897	876, 039
Georgia	451, 788	575, 152	1, 311, 917	1, 342, 249	893, 965	1, 386, 250	753, 484
Idaho	18, 204	27, 800	65, 363	645, 800	765, 388	1, 028, 791	840, 409
Illinois	334, 244	221, 810	388, 469	170, 181	64, 628	37, 681	25, 212
Indiana	915, 943	755, 407	1, 036, 999	556, 418	282, 487	169, 970	97, 837
Iowa	412, 578	571, 166	352, 411	132, 021	18, 493	(3)	(3)
Kansas	45, 281	4, 037	10, 665	4, 716	2, 840	(3)	(3)
Kentucky	305, 684	423, 185	774, 651	860, 712	512, 078	339, 146	189, 455
Louisiana	133, 472	303, 726	1, 115, 366	3, 551, 918	3, 163, 871	2, 232, 360	1, 606, 718
Maine	566, 656	597, 481	784, 647	1, 111, 565	596, 116	257, 910	222, 104
Maryland	[4] 127, 336	82, 119	183, 711	267, 939	113, 362	54, 870	47, 666
Massachusetts	205, 244	211, 588	344, 190	361, 200	166, 841	71, 863	82, 101
Michigan	4, 172, 572	4, 300, 172	3, 018, 338	1, 889, 724	875, 891	571, 017	466, 831
Minnesota	563, 974	1, 084, 377	2, 342, 338	1, 561, 508	699, 639	357, 180	222, 389
Mississippi	168, 747	454, 417	1, 206, 265	2, 572, 669	2, 390, 135	2, 669, 496	1, 484, 378
Missouri	399, 744	402, 052	723, 754	660, 150	321, 383	228, 078	126, 735
Montana	21, 420	89, 511	255, 685	308, 582	287, 378	388, 711	296, 990
Nebraska	13, 585	8, 561	4, 655	(3)	505	(3)	(3)
Nevada	21, 545	----------	725	(3)	20, 335	(5)	(5)
New Hampshire	292, 267	277, 063	572, 447	649, 606	338, 777	191, 703	181, 702
New Jersey	109, 679	34, 052	74, 118	61, 620	36, 888	15, 576	12, 333
New Mexico	11, 195	26, 112	30, 880	91, 987	86, 808	148, 287	142, 885
New York	1, 184, 220	925, 417	878, 448	681, 440	357, 764	159, 591	109, 617
North Carolina	241, 822	514, 692	1, 286, 638	2, 177, 715	1, 654, 435	1, 202, 377	814, 835
Ohio	910, 832	565, 315	999, 497	542, 904	280, 076	175, 537	108, 198
Oklahoma	----------	2, 552	22, 104	225, 730	168, 403	199, 744	163, 477
Oregon	177, 171	446, 483	734, 538	1, 898, 995	2, 577, 403	4, 784, 009	3, 654, 075
Pennsylvania	1, 733, 844	2, 133, 316	2, 333, 278	1, 462, 771	630, 471	314, 250	208, 762
Rhode Island	8, 469	7, 633	18, 528	25, 489	11, 030	6, 514	7, 019
South Carolina	185, 772	198, 764	466, 429	897, 660	621, 679	1, 067, 987	707, 415
South Dakota	29, 286	[6] 28, 283	[6] 33, 734	31, 057	42, 970	61, 126	59, 464
Tennessee	302, 673	460, 261	950, 958	1, 223, 849	792, 132	763, 828	413, 937
Texas	328, 968	842, 648	1, 232, 404	2, 099, 130	1, 379, 774	1, 451, 640	1, 045, 262
Utah	25, 709	14, 320	17, 548	12, 638	11, 917	5, 301	6, 489
Vermont	322, 942	384, 476	375, 809	351, 571	218, 479	119, 622	94, 217
Virginia	315, 939	415, 512	959, 119	2, 101, 716	1, 098, 038	708, 452	495, 489
Washington	160, 176	1, 063, 584	1, 429, 032	3, 862, 916	4, 961, 220	7, 302, 063	5, 502, 129
West Virginia	180, 117	301, 958	778, 051	1, 472, 942	763, 103	632, 992	406, 083
Wisconsin	1, 542, 021	2, 866, 153	3, 389, 166	2, 025, 038	1, 116, 338	842, 814	636, 844
Wyoming	2, 690	6, 417	16, 963	28, 602	8, 674	25, 629	25, 132
All other	----------	[7] 2, 816	[7] 6, 571	[8] 11, 230	----------	[9] 20, 332	[9] 13, 349
United States	18, 091, 356	[10] 23, 845, 046	[11] 35, 084, 166	44, 509, 761	[11, 12] 34, 552, 076	[13] 36, 886, 032	[13] 26, 051, 473

Forest Service in cooperation with Bureau of the Census.

[1] Preliminary.
[2] Includes cut of Nevada.
[3] Included in "All other."
[4] Includes cut of District of Columbia.
[5] Included with California.
[6] Includes cut of North Dakota.
[7] Reported as cut of Alaska.
[8] Includes cut of Nebaska and Nevada.
[9] Includes cut of Iowa, Kansas, and Nebraska.
[10] Excludes custom mills (3,196,527 M feet b. m.).
[11] Includes both merchant and custom sawing.
[12] Includes 2,655 mills cutting less than 50,000 feet each per year.
[13] Mills cutting less than 50,000 feet each year excluded.

TABLE 488.—*Average value of lumber at the mill per thousand feet board measure, in stated years*

Kind of wood	1899	1909	1919	1927	1929	1930
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Softwoods:						
Balsam fir	(1)	13.99	32.23	25.92	25.40	26.72
Cedar	10.91	19.95	33.80	34.39	34.83	31.14
Cypress	13.32	20.46	38.38	39.91	35.29	33.10
Douglas fir	8.67	12.44	24.62	19.45	20.05	16.91
Hemlock	9.98	13.95	29.16	19.06	18.90	17.04
Larch (tamarack)	8.73	12.68	23.39	17.69	18.35	17.18
Lodgepole pine	(1)	16.25	29.98	20.82	17.97	17.64
Redwood	10.12	14.80	30.04	33.81	31.00	30.33
Spruce	11.27	16.91	30.76	26.59	28.64	23.66
Sugar pine	12.30	18.14	35.99	43.22	43.08	38.10
Western yellow pine	9.70	15.39	27.75	26.04	26.47	23.52
White fir	(1)	13.10	25.66	19.92	20.63	17.57
White pine	12.69	18.16	32.83	29.90	29.87	27.81
Yellow pine	8.46	12.69	28.71	23.77	25.66	21.06
Hardwoods:						
Ash	15.84	24.44	52.69	43.82	43.14	39.72
Basswood	12.84	19.50	40.03	39.84	39.88	35.51
Beech	(1)	13.25	29.98	27.21	28.39	25.89
Birch	12.50	16.95	35.79	41.03	39.35	36.39
Chestnut	13.37	16.12	32.30	29.35	29.51	23.91
Cottonwood	10.37	18.05	32.24	30.92	29.70	22.73
Elm	11.47	17.52	36.39	36.22	35.28	30.20
Gum, red and sap	9.63	13.20	32.68	32.81	34.42	27.67
Hickory	18.78	30.80	44.37	37.08	40.33	33.00
Maple	11.83	15.77	35.56	35.35	36.93	34.54
Oak	13.78	20.50	37.87	35.72	38.43	29.29
Sycamore	11.04	14.87	30.32	29.31	30.07	26.54
Tupelo	(1)	11.87	28.42	24.45	25.39	23.47
Walnut	36.49	43.79	72.13	111.64	119.15	100.75
Yellow poplar	14.03	25.39	41.65	38.58	40.66	35.19
All kinds	11.13	15.38	30.21	25.80	26.94	22.81

Bureau of the Census in cooperation with the Forest Service.

[1] No data available.

TABLE 489.—*Lumber consumption per capita,[1] census years, 1809–1929*

Year	Per capita consumption	Year	Per capita consumption	Year	Per capita consumption
	Feet b. m.		*Feet b. m.*		*Feet b. m.*
1809	55	1879	365	1924	345
1819	55	1889	435	1925	345
1829	65	1899	460	1926	335
1839	95	1904	505	1927	300
1849	235	1909	475	1928	305
1859	260	1914	400	1929	275
1869	340	1919	325		

Forest service.

[1] This table takes into account the exports and imports of lumber, and in the decade, the estimated total production as well as the increases and decreases in mill and yard stocks.

TABLE 490.—*Pulpwood consumption, wood-pulp and paper production by States in stated years*

State	Pulpwood consumption				Wood-pulp production				Paper production			
	1909	1919	1929	1930	1909	1919	1929	1930	1925	1927	1929	1930
	1,000 cords	*1,000 cords*	*1,000 cords*	*1,000 cords*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*
California	[1] 52	(2)	(3)	(2)	[1] 27	(2)	(2)	(2)	177	219	254	231
Louisiana	------	(3)	460	423	------	(3)	247	244	124	204	274	278
Maine	904	1,280	1,312	1,203	604	917	981	905	868	954	1,061	1,029
Massachusetts	46	52	(3)	43	26	33	29	29	511	540	562	491
Michigan	133	207	313	280	64	106	178	193	847	1,004	1,092	991
Minnesota	47	204	266	230	37	130	190	182	224	281	318	279
New Hampshire	350	376	376	243	213	232	213	138	206	207	196	158
New York	922	1,055	826	763	686	812	663	596	1,503	1,458	1,513	1,348
North Carolina	145	159	(3)	(3)	54	61	(3)	(3)	(3)	(3)	70	65
Ohio	55	27	(3)	(3)	27	10	(3)	(3)	777	812	937	860
Oregon	104	[4] 172	(3)	[4] 351	84	[4] 124	[4] 257	[4] 249	146	188	223	129
Pennsylvania	295	424	398	353	136	215	213	189	678	716	749	666
Tennessee	------	(3)	(3)	75	------	(3)	(3)	53	31	33	84	97
Vermont	71	112	25	24	59	86	26	25	84	87	73	69
Virginia	92	126	375	378	49	62	206	216	143	193	242	262
Washington	(5)	139	956	1,000	(5)	84	524	566	179	233	382	395
West Virginia	109	84	(3)	(3)	49	39	(3)	(3)	49	48	52	35
Wisconsin	576	854	1,234	1,169	325	507	734	701	833	892	886	835
All other States	101	207	1,104	661	51	100	407	344	1,802	1,933	2,172	1,951
Total	4,002	5,478	7,645	7,196	2,491	3,518	4,863	4,630	9,182	10,002	11,140	10,169

Bureau of the Census in cooperation with the Forest Service.

[1] Includes Washington.
[2] Included with Oregon.
[3] Included in "All other States."
[4] Includes California.
[5] Included with California.

TABLE 491.—*Pulpwood consumption, wood-pulp and paper production of the United States*

Year	Pulpwood consumption	Wood-pulp production	Paper production	Year	Pulpwood consumption	Wood-pulp production	Paper production
	Cords	*Short tons*	*Short tons*		*Cords*	*Short tons*	*Short tons*
1899	1,986,310	1,179,525	2,167,593	1919	5,477,832	3,517,952	6,190,361
1904	------------	1,921,768	3,106,696	1920	6,114,072	3,821,704	7,334,614
1905	3,192,123	------------	------------	1921	4,557,179	2,875,601	5,356,317
1906	3,661,176	------------	------------	1922	5,548,842	3,521,644	7,017,800
1907	3,962,660	2,547,879	------------	1923	5,872,870	3,788,672	8,029,482
1908	3,346,953	2,118,947	------------	1924	5,768,082	3,723,266	------------
1909	4,001,607	2,495,523	4,216,708	1925	6,093,821	3,962,217	9,182,204
1910	4,094,306	2,533,976	------------	1926	6,766,007	4,394,766	------------
1911	4,328,052	2,686,134	------------	1927	6,750,935	4,313,403	10,002,070
1914	4,470,763	2,893,150	5,270,047	1928	7,160,100	4,510,800	10,403,338
1916	5,228,558	3,435,001	------------	1929	7,645,011	4,862,885	11,140,235
1917	5,480,075	3,509,939	5,919,647	1930	7,195,524	4,630,308	10,169,140
1918	5,250,794	3,313,861	6,051,523				

Bureau of the Census in cooperation with the Forest Service and Federal Trade Commission.

TABLE 492.—*Pulpwood consumption, by kinds, 1909, 1919, 1929, and 1930*

Kind of wood	1909	1919	1929	1930
	Cords	*Cords*	*Cords*	*Cords*
Spruce:				
Domestic	1,653,249	2,313,419	2,074,267	1,844,937
Imported	768,332	873,795	1,029,913	888,255
Hemlock:				
Domestic	559,657	795,154	1,309,170	[2] 1,222,961
Imported			15,379	
Pine:				
Southern yellow pine	(1)	234,463	1,036,272	[2] 1,030,273
Jack pine	(1)	51,581	195,577	200,970
Miscellaneous pines	90,885	7,566		
Poplar:				
Domestic	302,876	180,160	329,466	291,897
Imported	25,622	158,220	157,829	159,092
Balsam fir:				
Domestic	95,366	181,840	317,552	330,548
Imported		106,974	45,412	48,935
Yellow poplar		72,605	129,697	107,795
White fir	37,176	31,138	111,054	90,652
Beech, birch, and maple	31,390	[3] 183,426	76,950	[3] 225,147
Gum		30,355	39,685	41,825
Tamarack (larch)		44,042	51,835	40,054
Other woods	188,077	38,013	163,668	76,681
Slabs and mill waste	248,977	175,081	561,285	595,502
Total	4,001,607	5,477,832	7,645,011	7,195,524

Bureau of the Census in Cooperation with the Forest Service.

[1] Included in "Miscellaneous pines."
[2] Includes a small quantity of imported hemlock.
[3] Includes chestnut.

TABLE 493.—*Paper: Consumption by kinds, and apparent per capita, specified years, beginning 1810* [1]

Year	News-print	Book	Boards	Wrap-ping	Fine	All other	All kinds	Apparent per capita
	Thousand short tons	*Thousand short tons*	*Thousand short tons*	*Thousand short tons*	*Thousand short tons*	*Thousand short tons*	*Thousand short tons*	*Pounds*
1810							[2] 3	1
1819							[2] 12	2
1839							[2] 38	4
1849							[2] 78	7
1859							[2] 127	8
1869							391	20
1879							457	18
1889							1,121	36
1899	569	314	394	535	113	233	2,158	57
1904	883	495	521	644	142	365	3,050	74
1909	1,159	689	883	763	193	537	4,224	93
1914	1,576	926	1,292	892	244	566	5,496	112
1917	1,824	846	1,805	814	276	691	6,256	122
1918	1,760	800	1,927	859	348	693	6,387	123
1919	1,892	838	1,940	825	306	692	6,493	124
1920	2,196	1,060	2,301	1,003	371	930	7,861	148
1921	2,002	707	1,641	770	230	704	6,054	112
1922	2,451	968	2,154	1,059	356	1,015	8,003	146
1923	2,814	1,235	2,802	1,177	374	938	9,340	167
1925	3,073	1,365	3,290	1,287	472	1,103	10,590	184
1926	3,517	1,408	3,637	1,435	495	1,315	11,807	203
1927	3,492	1,265	3,737	1,515	502	1,404	11,915	202
1928	3,561	1,321	4,009	1,457	538	1,562	12,448	208
1929	3,813	1,471	4,398	1,586	593	1,490	13,351	220
1930	3,496	1,370	4,014	1,556	564	1,251	12,251	199

Forest Service. A computed table based on Bureau of the Census and Forest Service bulletins.

[1] Imports added to United States production and domestic exports deducted.
[2] Domestic production only, value of exports and imports being approximately equal.

TABLE 494.—*Stock grazed on the national forests, and receipts, by years*

Fiscal year	Cattle	Horses	Swine	Sheep	Goats	Receipts for grazing by fiscal years
	Number	*Number*	*Number*	*Number*	*Number*	*Dollars*
1905	632,793	59,331	----------	1,709,987	----------	(1)
1906	1,015,148	(2)	----------	5,762,200	(3)	513,000
1907	1,200,158	(2)	----------	6,657,083	(3)	857,005
1908	1,304,142	76,003	2,076	6,960,919	126,192	947,365
1909	1,491,385	90,019	4,501	7,679,698	139,896	[4] 1,022,516
1910	1,409,873	84,552	3,145	7,558,650	90,300	969,971
1911	1,351,922	91,516	4,500	7,371,747	77,668	927,967
1912	1,403,025	95,343	4,330	7,467,890	83,849	[4] 961,489
1913	1,455,922	97,919	3,277	7,790,953	76,898	999,369
1914	1,517,045	99,835	3,381	7,560,186	58,616	1,002,348
1915	1,627,321	96,933	2,792	7,232,276	51,409	1,130,495
1916	1,758,764	98,903	2,968	7,843,205	43,268	1,210,215
1917	1,953,198	98,880	2,306	7,586,034	49,939	1,549,795
1918	2,137,854	102,156	3,371	8,454,240	57,968	1,725,822
1919	2,135,527	93,251	5,154	7,935,174	60,789	2,609,170
1920	2,033,800	83,015	4,066	7,271,136	53,685	2,486,040
1920 [5]	88,599	6,444	1,010	553,263	3,346	----------
1921 [6]	1,999,680	78,115	2,453	6,936,377	43,574	2,132,075
1922 [6]	1,882,491	67,856	2,149	6,497,912	36,153	1,315,975
1923 [6]	1,804,274	64,104	1,347	6,377,759	31,379	2,341,486
1924 [6]	1,664,087	58,184	1,560	6,301,308	29,068	1,915,561
1925 [6]	1,538,942	57,904	846	6,162,263	19,795	1,725,377
1926 [6]	1,456,858	57,396	1,085	6,212,657	15,666	1,421,589
1927 [6]	1,403,192	55,629	997	6,376,838	18,046	1,530,952
1928 [6]	1,335,903	51,956	1,206	6,497,081	17,070	1,713,730
1929 [6]	1,322,465	48,171	853	6,650,719	15,487	1,740,290
1930 [6]	1,321,431	42,357	540	6,799,236	13,496	1,942,914

Forest Service.

[1] No data available.
[2] Included with cattle.
[3] Included with sheep.
[4] Subject to revision.
[5] Last 6 months only.
[6] Calendar year.

TABLE 495.—*Number of stock grazed on national forests, by States, calendar year 1930, and total grazing receipts, fiscal year 1930*

State	Cattle	Horses	Swine	Sheep	Goats	Receipts from grazing [1]
	Number	*Number*	*Number*	*Number*	*Number*	*Dollars*
Alabama	8	2	----------	----------	----------	30
Arizona	173,788	1,533	272	354,773	426	138,481
Arkansas	394	----------	----------	----------	----------	408
California	145,583	3,997	179	414,164	1,764	196,413
Colorado	274,941	3,415	----------	1,079,496	645	387,085
Florida	443	----------	----------	1,483	----------	397
Idaho	114,285	7,206	----------	1,365,127	----------	247,363
Montana	125,491	8,442	----------	638,381	75	166,561
Nebraska	11,255	360	----------	----------	----------	8,122
Nevada	51,948	2,005	----------	340,855	----------	95,550
New Hampshire	130	6	----------	----------	----------	249
New Mexico	82,049	2,964	84	225,577	10,526	88,999
North Carolina	259	4	----------	34	----------	246
Oklahoma	2,364	75	----------	----------	----------	3,645
Oregon	84,754	2,635	----------	698,506	60	187,146
South Dakota	26,375	1,135	----------	32,617	----------	23,125
Tennessee	290	----------	----------	70	----------	212
Utah	108,491	3,982	5	788,441	----------	201,035
Virginia	694	7	----------	428	----------	865
Washington	13,196	371	----------	187,691	----------	47,377
West Virginia	198	12	----------	943	----------	526
Wyoming	104,495	4,206	----------	670,650	----------	166,681
Total	1,321,431	42,357	540	6,799,236	13,496	[2] 1,960,642

Forest Service.

[1] Includes grazing trespass.
[2] Includes Georgia $107, Maine $17, and South Carolina $9.

TABLE 496.—*Free-use timber, cut from national forests, by States, 1910, 1920, 1929, and 1930*

State	Fiscal year 1910		Fiscal year 1920		Calendar year 1929		Calendar year 1930	
	Total quantity	Estimated users	Total quantity	Estimated users	Total quantity	Estimated users	Total quantity	Estimated users
	M ft. b. m.	*Number*	*M ft. b. m.*	*Number*	*M ft. b. m.*	*Number*	*M ft. b. m.*	*Number*
Alabama			1	12				
Alaska	184	6	4, 897	503	533	502	510	503
Arizona	5, 254	1, 972	6, 418	4, 306	7, 574	5, 929	8, 921	4, 637
Arkansas	513	536	61	9	25	17	132	46
California	7, 647	3, 215	5, 238	1, 606	3, 905	2, 596	3, 949	3, 203
Colorado	12, 550	3, 598	9, 783	3, 920	7, 436	2, 674	9, 326	3, 120
Florida	95	32	330	96				
Georgia			10	8				
Idaho	19, 937	6, 472	14, 455	5, 530	14, 936	4, 797	22, 631	7, 289
Michigan			216	42	475	61	918	131
Minnesota	381	15	160	64	167	46	183	40
Montana	14, 713	5, 441	8, 151	4, 290	10, 426	6, 144	16, 800	11, 961
Nebraska			3	3				
Nevada	1, 710	678	1, 777	528	1, 735	419	1, 793	418
New Mexico	10, 004	3, 801	8, 859	6, 472	10, 614	7, 246	15, 818	7, 797
North Carolina			17	12	778	406	709	371
North Dakota	21	62						
Oklahoma	123	192	180	600	60	65	65	70
Oregon	10, 068	2, 455	7, 515	1, 428	6, 360	1, 382	8, 882	1, 864
Pennsylvania					25	5	350	84
South Dakota	3, 476	1, 185	2, 963	910	1, 751	523	1, 755	509
Tennessee			1, 027	385	656	407	607	325
Utah	8, 260	3, 426	8, 553	4, 985	11, 389	6, 788	13, 293	9, 239
Virginia			148	97	316	187	491	287
Washington	2, 444	503	1, 026	251	727	237	1, 142	316
West Virginia			8	3	31	10		
Wyoming	7, 416	1, 775	6, 264	1, 276	6, 849	1, 684	7, 821	1, 720
Total	104, 796	35, 364	88, 060	37, 336	86, 768	42, 135	116, 096	53, 930

Forest Service.

TABLE 497.—*Turpentine and rosin: Industrial consumption, calendar years 1928–1930*

Industry	Turpentine			Rosin		
	1928	1929	1930	1928	1929	1930
	Gallons	*Gallons*	*Gallons*	*500-pound barrels*	*500-pound barrels*	*500-pound barrels*
Automobiles and wagons	158, 901	100, 815	80, 953	1, 214	2, 797	3, 523
Chemicals and pharmaceuticals	55, 235	60, 474	70, 185	3, 709	5, 332	5, 246
Foundries and foundry supplies	15, 001	10, 136	27, 144	18, 558	29, 349	17, 399
Linoleum	2, 312	81	2, 754	58, 204	44, 811	29, 458
Matches	250			2, 810	3, 430	2, 953
Miscellaneous	36, 308	61, 633	65, 556	2, 555	6, 204	3, 752
Oils and greases	42, 969	28, 380	21, 776	48, 609	54, 427	49, 828
Paper and paper size	4, 231	6, 159	1, 771	333, 942	388, 310	341, 327
Paint and varnish	4, 306, 483	4, 630, 505	4, 089, 743	245, 157	283, 842	192, 878
Printing ink	10, 131	14, 232	11, 209	14, 815	15, 269	13, 104
Sealing wax, pitch, insulations, and plastics	68, 248	75, 280	70, 236	34, 537	40, 892	26, 291
Shipyards, car shops, etc	41, 315	62, 865	65, 520	104	790	3, 086
Shoe polish	561, 116	567, 920	527, 838	635	719	610
Soap	1, 599	4, 215	10, 539	182, 538	228, 599	218, 967
Total	5, 304, 099	5, 622, 695	5, 045, 224	947, 387	1, 104, 771	908, 422

Bureau of Chemistry and Soils. A few concerns did not report; to cover these, estimates were made. The estimated quantities consumed by the nonreporting concerns are less than 5 per cent of the total.

TABLE 498.—*Hunters' licenses issued by States, with total money returns, for the seasons 1928–29 and 1929–30*

State	Licenses issued: Resident 1928–29	Resident 1929–30	Nonresident and alien 1928–29	Nonresident and alien 1929–30	Total 1928–29	Total 1929–30	Money returns [1] 1928–29	Money returns [1] 1929–30
Alaska	(2)	(2)	227	214	227	214	$16,490.00	$14,950.00
Alabama	81,515	84,794	197	223	81,712	85,017	124,594.00	117,478.51
Arizona	[3] 26,697	[3] 29,175	[3] 821	[3] 950	27,518	30,125	85,318.50	113,602.50
Arkansas	90,000	83,000	1,500	1,830	91,500	84,830	112,500.00	112,575.00
California	238,569	229,767	2,878	2,203	241,447	231,970	488,114.32	464,157.00
Colorado	[3] 110,084	[3] 110,888	397	323	110,481	111,211	236,401.50	241,505.25
Connecticut	35,936	28,465	601	587	36,537	29,052	99,959.75	109,680.00
Delaware	[3] 2,054	[3] 2,193	[3] 360	[3] 162	2,414	2,355	5,685.00	4,623.00
Florida	43,606	[3] 47,670	568	[3] 566	44,174	48,236	180,529.00	123,164.00
Georgia	65,977	47,006	202	162	66,179	47,168	91,583.23	69,090.67
Idaho	[3] 83,243	86,004	[3] 439	506	83,682	86,510	165,213.90	171,747.65
Illinois	300,413	340,547	2,283	1,999	302,696	342,546	335,799.50	286,233.00
Indiana	[3] 309,191	[3] 304,444	[3] 468	[3] 342	309,659	304,786	298,644.00	279,261.80
Iowa	[3] 173,116	[3] 227,483	200	248	173,316	227,731	175,116.00	231,203.00
Kansas	127,926	143,539	109	93	128,035	143,632	128,931.00	144,934.00
Kentucky	104,213	113,220	286	470	104,499	113,690	107,216.00	100,307.00
Louisiana	99,632	107,844	435	314	100,067	108,158	110,382.00	115,794.00
Maine	[3] 34,748	[3] 78,959	3,864	4,639	38,612	83,598	52,350.70	97,521.45
Maryland	66,766	71,576	1,800	1,979	68,566	73,555	130,101.55	140,004.55
Massachusetts	[3] 118,014	[3] 118,861	[3] 3,462	3,585	121,476	122,446	255,014.00	257,138.00
Michigan	317,622	404,129	2,434	2,704	320,056	406,833	400,510.99	625,601.25
Minnesota	110,536	245,972	364	368	110,900	246,340	107,674.84	274,324.55
Missouri	[3] 254,740	[3] 230,714	[3] 842	[3] 721	255,582	231,435	303,511.18	322,189.50
Montana	[3] 79,227	[3] 83,388	274	212	79,501	83,600	156,115.20	170,706.00
Nebraska	[3] 170,895	[3] 187,231	[3] 178	441	171,073	187,672	174,250.00	191,641.00
Nevada	7,448	7,142	151	134	7,599	7,276	11,398.50	21,555.00
New Hampshire	[3] 56,241	[3] 53,716	[3] 2,590	[3] 2,375	58,831	56,091	114,775.35	134,999.60
New Jersey	[3] 195,121	[3] 195,216	[3] 2,139	[3] 1,755	197,260	196,971	314,071.50	279,336.60
New Mexico	[3] 17,586	[3] 18,249	[3] 1,381	[3] 1,635	18,967	19,884	92,000.00	98,038.25
New York	[3] 671,728	717,106	5,409	4,065	677,137	721,171	703,047.87	735,295.44
North Carolina	117,691	124,234	1,221	1,275	118,912	125,509	188,819.50	203,433.60
North Dakota	34,108	33,550	163	156	34,271	33,706	55,237.00	50,834.90
Ohio	381,817	446,329	29	98	381,846	446,427	382,252.00	447,799.00
Oklahoma	158,822	127,841	383	888	159,205	128,729	164,451.50	132,945.00
Oregon	[3] 60,818	[3] 64,314	593	609	61,411	64,923	222,785.50	233,778.00
Pennsylvania	516,603	505,103	1,190	4,823	517,793	509,926	998,834.70	1,029,745.70
Rhode Island	9,426	9,503	299	263	9,725	9,766	22,900.00	21,703.00
South Carolina	89,396	99,521	1,384	1,598	90,780	101,119	142,026.00	158,751.00
South Dakota	[3] 113,229	[3] 107,346	2,838	2,795	116,067	110,141	192,891.00	186,057.00
Tennessee	63,741	----------	293	-------	64,034	----------	80,152.00	------------
Texas	113,833	113,047	517	478	114,350	113,525	221,965.05	219,652.95
Utah	[3] 15,841	[3] 47,655	[3] 253	[3] 279	16,094	47,934	33,507.60	110,829.00
Vermont	[3] 40,678	[3] 39,737	[3] 1,312	[3] 1,141	41,990	40,878	60,349.80	57,644.95
Virginia	[3] 140,607	[3] 148,790	[3] 2,687	[3] 2,693	143,294	151,483	239,560.30	259,303.55
Washington	204,696	[3] 211,118	647	876	205,343	211,994	371,981.00	381,664.00
West Virginia	[3] 135,664	[3] 145,809	489	295	136,153	146,104	176,916.00	189,112.50
Wisconsin	158,840	204,855	229	314	159,069	205,169	148,881.00	195,969.50
Wyoming	[3] 28,045	[3] 21,169	[3] 676	412	28,721	21,581	110,603.00	86,044.50
Total [4]	6,376,699	6,848,219	52,062	54,798	6,428,761	6,903,017	9,391,412.33	10,013,925.72

Bureau of Biological Survey.

[1] Includes amounts received from combined hunting and fishing licenses, but not from licenses to fish only.
[2] No resident license required.
[3] Combined hunting and fishing license.
[4] Totals are exclusive of Mississippi for both seasons and of Tennessee for the 1929–30 season, as the figures are not available. Figures given include combined hunting and fishing licenses, which for many States can not be separated, many such licenses being taken out by anglers only.

TABLE 499.—*Current status of Federal-aid and emergency road construction as of June 30, 1931*

State	Completed mileage	Under construction						Approved for construction						Balance of Federal aid funds available for new projects
		Estimated total cost	Federal aid allotted	Emergency advance fund [1]	Mileage			Estimated total cost	Federal aid allotted	Emergency advance fund [1]	Mileage			
					Initial [2]	Stage [3]	Total				Initial [2]	Stage [3]	Total	
		Dollars	*Dollars*	*Dollars*	*Miles*	*Miles*	*Miles*	*Dollars*	*Dollars*	*Dollars*	*Miles*	*Miles*	*Miles*	*Dollars*
Alabama	2, 115. 8	7, 537, 014. 55	3, 671, 288. 23	1, 564, 430. 71	236. 7	114. 8	351. 5	93, 312. 53	46, 656. 26	34, 691. 58	1. 4	2. 7	4. 1	3, 291, 396. 79
Arizona	841. 9	6, 419, 231. 92	4, 295, 941. 88	1, 081, 000. 52	260. 0	229. 3	489. 3	84, 143. 72	54, 813. 77	13, 504. 20	2. 4	5. 1	7. 5	92, 674. 36
Arkansas	1, 737. 7	9, 139, 166. 13	4, 354, 305. 88	1, 373, 157. 00	235. 6	102. 1	337. 7	1, 491, 745. 71	713, 622. 89		23. 7	29. 9	53. 6	114, 579. 53
California	1, 928. 0	12, 395, 686. 82	5, 206, 186. 73	2, 672, 268. 60	293. 4	103. 5	396. 9	1, 804, 148. 84	663, 854. 92	291, 467. 14	60. 4		60. 4	926, 385. 10
Colorado	1, 343. 3	5, 781, 305. 19	3, 115, 215. 63	1, 316, 888. 20	206. 2	89. 0	295. 2	328, 975. 27	184, 752. 46	51, 871. 71	15. 9	21. 4	37. 3	1, 968, 342. 74
Connecticut	256. 9	4, 952, 568. 48	1, 794, 286. 20	520, 491. 00	49. 0		49. 0	377, 652. 56	176, 946. 82		5. 5		5. 5	4, 388. 65
Delaware	306. 0	1, 041, 247. 28	519, 869. 13	400, 000. 00	52. 6		52. 6	180, 024. 00	90, 012. 00		7. 4		7. 4	73, 516. 71
Florida	540. 0	6, 424, 859. 85	3, 007, 205. 42	1, 029, 346. 35	175. 5		175. 5	102, 816. 84	51, 408. 41	13, 258. 00	13. 3		13. 3	1, 604, 812. 74
Georgia	2, 795. 0	9, 004, 537. 69	4, 302, 305. 86	1, 818, 777. 17	303. 1	113. 8	416. 9	1, 555, 393. 35	730, 085. 16	48, 300. 00	77. 7	18. 2	95. 9	1, 049, 771. 28
Idaho	1, 281. 9	4, 085, 734. 91	2, 297, 771. 02	869, 534. 92	271. 2	32. 9	304. 1	987, 824. 36	574, 435. 01	137, 770. 21	58. 3	55. 9	114. 2	395, 029. 73
Illinois	2, 267. 7	25, 622, 268. 77	11, 785, 892. 09	2, 376, 700. 00	769. 3	41. 1	810. 4	8, 257, 424. 68	3, 778, 078. 65	1, 012, 300. 00	271. 9	4. 7	276. 6	279, 005. 33
Indiana	1, 579. 0	9, 209, 958. 89	4, 536, 328. 72	1, 030, 313. 38	281. 3		281. 3	3, 030, 777. 18	1, 453, 338. 00	353, 212. 70	129. 5		129. 5	755, 222. 13
Iowa	3, 153. 1	7, 386, 346. 86	3, 144, 075. 10	1, 993, 369. 00	167. 3	72. 1	239. 4	549, 700. 61	182, 458. 80	123, 000. 00		17. 4	17. 4	4, 059. 10
Kansas	3, 148. 8	8, 883, 373. 59	4, 247, 356. 40	1, 535, 965. 37	505. 6	55. 8	561. 4	1, 804, 249. 75	868, 140. 63	175, 947. 54	113. 0	46. 2	159. 2	386, 026. 70
Kentucky	1, 519. 0	7, 439, 643. 91	3, 259, 483. 02	1, 195, 190. 78	284. 4	131. 1	415. 5	880, 912. 21	428, 092. 95	239, 600. 00	60. 8	19. 8	80. 6	183, 559. 55
Louisiana	1, 418. 9	8, 422, 172. 79	4, 005, 813. 00	1, 137, 927. 00	245. 9	19. 3	265. 2	120, 355. 82	58. 515. 39	10, 000. 00	5. 1	. 6	5. 7	253, 076. 15
Maine	603. 2	4, 337, 397. 40	1, 642, 395. 30	637, 799. 00	101. 0		101. 0	1, 084, 671. 79	470, 583. 82	43, 000. 00	19. 9		19. 9	612, 261. 07
Maryland	707. 0	1, 652, 189. 40	759, 448. 81	582, 772. 49	47. 9	4. 2	52. 1	405, 155. 40	202, 577. 69	68, 339. 88	17. 7		17. 7	91, 940. 51
Massachusetts	724. 2	9, 210, 169. 31	2, 276, 626. 32	802, 509. 00	78. 9		78. 9	1, 467, 104. 61	563, 500. 20	266, 000. 00	17. 0		17. 0	1, 597, 158. 35
Michigan	1, 804. 8	10, 793, 690. 64	4, 466, 907. 21	1, 108, 000. 00	314. 4	23. 9	338. 3	2, 142, 332. 29	1, 024, 613. 00	257, 500. 00	81. 7	27. 3	109. 0	1, 973, 791. 60
Minnesota	3, 987. 3	7, 643, 473. 34	3, 237, 288. 25	1, 954, 993. 00	74. 3	284. 5	358. 8	1, 278, 434. 70	546, 474. 69	295, 000. 00	5. 6	49. 6	55. 2	27, 432. 47
Mississippi	1, 772. 7	4, 089, 403. 10	2, 013, 896. 18	1, 401, 409. 53	182. 0	80. 5	262. 5	402, 117. 91	201, 058. 94	30, 908. 89	2. 5	18. 3	20. 8	3, 759, 645. 69
Missouri	2, 659. 5	9, 829, 670. 52	3, 905, 276. 93	2, 264, 272. 94	246. 8	65. 0	311. 8	1, 979, 887. 13	846, 926. 77	213, 472. 79	61. 2	25. 8	87. 0	30, 847. 48
Montana	1, 835. 1	11, 719, 226. 48	6, 597, 231. 21	1, 637, 674. 28	888. 2	157. 9	1, 046. 1	438, 573. 99	243, 222. 95	7, 500. 00	36. 9	29. 2	66. 1	2, 120, 118. 98
Nebraska	3, 848. 9	9, 110, 895. 80	4, 268, 494. 24	1, 577, 666. 73	245. 9	199. 7	445. 6	1, 653, 248. 55	759, 179. 23	108, 165. 89	54. 9	68. 9	123. 8	904, 033. 63
Nevada	1, 092. 0	2, 946, 231. 13	1, 983, 134. 43	813, 056. 02	108. 0	248. 6	356. 6	628, 107. 07	395, 796. 58	200, 366. 44	18. 8	24. 8	43. 6	204, 157. 11
New Hampshire	392. 9	1, 343, 033. 46	515, 208. 60	270, 000. 00	26. 1	1. 0	27. 1	465, 120. 12	127, 744. 36	130, 000. 00	3. 4	7. 3	10. 7	94, 801. 98
New Jersey	555. 2	6, 209, 545. 44	1, 794, 968. 33	1, 103, 770. 59	74. 7		74. 7	144, 716. 24	3, 420. 00		. 2		. 2	1, 177, 568. 27
New Mexico	1, 927. 9	6, 820, 755. 52	4, 117, 269. 64	1, 259, 480. 49	251. 5	145. 5	397. 0	107, 277. 63	67, 700. 35		. 2		. 2	86, 785. 38
New York	2, 684. 0	39, 415, 270. 33	13, 701, 573. 50	3, 714, 566. 00	690. 9	7. 0	697. 9	6, 191, 200. 00	2, 428, 525. 00	230, 000. 00	115. 9		115. 9	15, 421. 72
North Carolina	1, 970. 6	6, 565, 115. 87	3, 126, 179. 57	1, 626, 473. 82	213. 1	35. 4	248. 5	1, 023, 035. 04	503, 233. 00	233, 527. 76	29. 0	36. 4	65. 4	1, 608, 127. 62
North Dakota	4, 363. 2	4, 377, 946. 70	2, 233, 117. 38	961, 858. 98	453. 3	457. 4	910. 7	877, 431. 89	438, 715. 84	118, 900. 00	90. 4	194. 9	285. 3	1, 087, 249. 83
Ohio	2, 553. 6	15, 298, 336. 93	4, 780, 217. 25	1, 830, 069. 07	231. 1	21. 6	252. 7	5, 056, 660. 86	1, 964, 856. 48	1, 168, 468. 93	95. 9	23. 4	119. 3	1, 236, 446, 47
Oklahoma	1, 981. 3	7, 764, 820. 32	3, 678, 809. 67	1, 601, 769. 48	298. 4	117. 7	416. 1	1, 078, 316. 17	579, 499. 44	308, 814. 37	39. 0	13. 9	52. 9	8, 011. 61
Oregon	1, 267. 7	7, 564, 517. 07	4, 175, 255. 21	1, 012, 430. 03	246. 8	90. 3	337. 1	728, 600. 13	362, 847. 87	292, 423. 05	49. 1	8. 4	57. 5	442, 216. 97
Pennsylvania	2, 664. 4	12, 715, 867. 36	5, 194, 853. 56	2, 713, 936. 94	251. 7		251. 7	2, 700, 355. 73	1, 295, 663. 77	787, 079. 41	96. 4		96. 4	1, 151, 378. 69
Rhode Island	215. 4	2, 621, 715. 53	976, 610. 80	400, 000. 00	42. 1		42. 1	91, 465. 74	45, 732. 86		. 1		. 1	98, 072. 80

South Carolina	1,853.5	5,423,297.93	2,457,109.74	1,114,636.00	78.2	152.8	231.0							242,641.12
South Dakota	3,741.6	6,206,502.83	3,334,679.87	1,220,359.54	419.4	188.4	607.8	512,582.94	254,606.69	37,000.00	15.1	47.1	62.2	383,082.29
Tennessee	1,461.4	4,542,803.15	2,237,133.62	1,741,881.99	193.7	17.4	211.1	380,641.70	190,320.84		26.0		26.0	1,838,996.09
Texas	6,979.5	20,038,372.56	9,178,199.78	4,649,762.26	858.4	324.4	1,182.8	2,777,023.12	1,226,795.58	435,636.91	87.6	51.2	138.8	3,256,372.24
Utah	1,041.5	2,204,486.97	1,281,752.41	608,169.04	133.9	38.9	172.8	819,142.92	483,403.55	221,262.73	31.2	92.8	124.0	524,243.32
Vermont	301.6	1,291,829.51	529,907.38	365,064.10	30.5	4.7	35.2	99,416.46	25,868.93	10,785.65	2.3		2.3	52,345.06
Virginia	1,624.7	6,193,760.18	2,810,606.22	1,457,161.72	260.9	46.2	307.1	497,760.77	246,236.51	6,200.00	18.4	.6	19.0	578,394.71
Washington	1,001.4	5,833,992.87	2,590,959.02	1,168,780.48	175.7	26.8	202.5	774,880.71	326,442.43	61,308.65	12.7	17.1	29.8	893,899.52
West Virginia	772.6	5,156,102.15	2,037,767.87	693,627.31	129.9	12.5	142.4	626,633.87	274,083.33	135,830.00	9.1	12.9	22.0	334,335.98
Wisconsin	2,414.8	8,618,261.82	3,763,295.04	1,805,000.00	228.9	74.5	303.4	1,690,746.84	552,719.04	182,211.21	48.9	17.6	66.5	82,080.01
Wyoming	1,629.0	4,684,178.27	2,794,003.06	899,674.51	351.0	242.4	593.4	311,033.86	155,516.00	115,600.00	10.7	43.9	54.6	162,707.71
Hawaii	47.6	1,429,014.40	580,743.37	394,528.83	41.1		41.1	82,324.99	22,869.00		1.5		1.5	1,579,975.17
Total	88,713.1	387,396,991.92	172,587,244.08	67,308,514.17	12,305.8	4,174.0	16,479.8	60,165,458.60	26,885,946.86	8,470,225.64	1,945.6	1,033.3	2,978.9	39,638,888.04

Bureau of Public Roads.

1 On Dec. 20, 1930, an emergency advance fund of $80,000,000 was authorized to be advanced to the States as a loan and to be used in matching regular Federal-aid authorizations. This fund was available for use only on work performed prior to Sept. 1, 1931. The Federal government is to be repaid for such loans by deductions from subsequent Federal-aid apportionments.

2 Initial Federal-aid construction refers to projects which are being improved with Federal aid for the first time. Such projects may or may not have been previously improved.

3 The term stage construction refers to additional work done on projects previously improved with Federal aid. In general, such additional work consists of the construction of a surface of higher type than was provided in the initial improvement.

TABLE 500.—*Federal-aid highway system: Mileage, Federal-aid apportionment for fiscal year 1932, and total apportionment for years 1917 to 1933, inclusive*

State	Mileage in approved system June 30, 1931	Apportionment for fiscal year 1933 [1]	Aggregates of apportionments for fiscal years 1917 to 1933, inclusive
	Miles	*Amount*	*Amount*
Alabama	3, 931	$2, 250, 169. 00	$26, 466, 617. 00
Arizona	1, 979	1, 556, 080. 80	17, 893, 597. 80
Arkansas	4, 953	1, 846, 477. 60	21, 632, 105. 60
California	4, 889	4, 121, 029. 40	42, 020, 084. 40
Colorado	3, 584	1, 988, 953. 60	23, 103, 140. 60
Connecticut	904	687, 401. 80	8, 036, 063. 80
Delaware	608	529, 375. 00	5, 320, 692. 00
Florida	1, 926	1, 437, 372. 40	15, 315, 624. 40
Georgia	5, 557	2, 753, 344. 80	33, 759, 273. 80
Idaho	3, 116	1, 330, 448. 00	15, 805, 218. 00
Illinois	6, 772	4, 476, 553. 80	54, 049, 531. 80
Indiana	4, 740	2, 698, 897. 20	33, 031, 792. 20
Iowa	7, 214	2, 799, 805. 20	35, 069, 285. 20
Kansas	7, 920	2, 889, 065. 80	35, 363, 804. 80
Kentucky	3, 699	1, 994, 012. 00	24, 183, 801. 00
Louisiana	2, 725	1, 537, 800. 60	17, 353, 278. 60
Maine	1, 576	944, 168. 20	11, 699, 768. 20
Maryland	1, 828	895, 409. 60	10, 831, 826. 60
Massachusetts	1, 437	1, 511, 244. 00	18, 523, 440. 00
Michigan	5, 242	3, 338, 014. 60	37, 638, 783. 60
Minnesota	6, 885	2, 976, 273. 40	35, 921, 156. 40
Mississippi	3, 661	1, 907, 440. 80	22, 386, 387. 80
Missouri	7, 530	3, 314, 415. 40	41, 240, 932. 40
Montana	5, 127	2, 230, 177. 00	25, 488, 631. 00
Nebraska	5, 574	2, 256, 040. 80	26, 943, 722. 80
Nevada	1, 560	1, 392, 753. 40	16, 259, 531. 40
New Hampshire	988	529, 375. 00	6, 016, 126. 00
New Jersey	1, 315	1, 463, 483. 60	15, 868, 408. 60
New Mexico	3, 616	1, 732, 343. 40	20, 243, 450. 40
New York	6, 732	5, 342, 506. 80	62, 299, 059. 80
North Carolina	4, 374	2, 550, 007. 00	29, 163, 944. 00
North Dakota	7, 439	1, 710, 936. 60	20, 057, 882. 60
Ohio	5, 899	3, 971, 690. 40	47, 164, 053. 40
Oklahoma	5, 769	2, 553, 034. 80	29, 711, 400. 80
Oregon	3, 247	1, 763, 260. 60	20, 205, 543. 60
Pennsylvania	6, 335	4, 640, 667. 40	57, 031, 871. 40
Rhode Island	452	529, 375. 00	5, 514, 203. 00
South Carolina	3, 232	1, 469, 603. 80	17, 996, 865. 80
South Dakota	6, 193	1, 765, 764. 40	20, 720, 404. 40
Tennessee	3, 733	2, 302, 158. 60	27, 794, 856. 60
Texas	11, 722	6, 770, 221. 00	76, 124, 722. 00
Utah	1, 751	1, 223, 560. 80	14, 424, 142. 80
Vermont	1, 036	529, 375. 00	6, 115, 141. 00
Virginia	3, 650	1, 992, 380. 60	24, 575, 820. 60
Washington	3, 033	1, 681, 216. 40	19, 124, 398. 40
West Virginia	2, 216	1, 162, 217. 20	13, 548, 177. 20
Wisconsin	5, 493	2, 640, 713. 00	31, 834, 206. 00
Wyoming	3, 498	1, 359, 009. 40	15, 882, 307. 40
Hawaii	217	529, 375. 00	3, 619, 923. 00
Total	196, 877	105, 875, 000. 00	1, 240, 375, 000. 00

Bureau of Public Roads.

[1] Net apportionment after deduction of $16,000,000 in repayment of emergency advance funds.

TABLE 501.—*Mileage of roads in State highway systems, including Federal-aid system, at end of 1930 and total mileage 1921, 1923–1930, as reported by State highway departments*

State	Total system mileage	Earth nonsurfaced: Unimproved	Earth nonsurfaced: Improved to grade	Surfaced roads by types: Total surfaced mileage	Sand-clay, top-soil	Gravel, chert, etc.	Water-bound macadam (treated and untreated)	Bituminous macadam	Bituminous concrete (including sheet asphalt)	Portland cement concrete	Brick and block
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama	5, 526	1, 127	811	3, 588	959	1, 826	28	165	124	486	
Arizona	2, 633	475	294	1, 864	130	1, 504		24	66	140	
Arkansas	8, 810	632	1, 312	6, 866		5, 697		136	350	683	
California	6, 589	1, 677	430	4, 482		1, 813		399	636	1, 634	
Colorado	9, 234	4, 176	683	4, 375	76	3, 905			14	380	
Connecticut	2, 234		95	2, 139		302	892	304	155	485	1
Delaware	817			817		47	17	48	19	680	6
Florida	6, 663	2, 654	215	3, 794	812	8	1, 851	148	234	453	288
Georgia	7, 124	2, 853	355	3, 916	1, 770	766	237	299	167	676	1
Idaho	4, 565	1, 361	445	2, 759	11	2, 517		22	152	57	
Illinois	9, 889	1, 923	263	7, 703		3	1	3	16	7, 541	139
Indiana	6, 111		125	5, 986		1, 875	974	544	44	2, 459	90
Iowa	7, 685	636	513	6, 536		3, 039				3, 464	33
Kansas	8, 690	3, 945	505	4, 240	2, 635	487		172	3	781	162
Kentucky	15, 000	6, 223	623	8, 154		3, 162	3, 984	525	21	436	26
Louisiana	10, 509	2, 662	298	7, 549		6, 864	7	16	123	533	6
Maine	2, 039	152	1	1, 886	4	1, 508	8	237		129	
Maryland	3, 253			3, 253		520	1, 148	48	150	1, 386	1
Massachusetts	1, 624			1, 624		60	194	852	230	285	3
Michigan	8, 109	459	93	7, 557	100	3, 488	537	111	381	2, 928	12
Minnesota	6, 891		97	6, 794	195	5, 165			77	1, 340	17
Mississippi	6, 101	170	594	5, 337	1	4, 853	11	51	21	387	13
Missouri	8, 446	2, 043	765	5, 638		2, 918		130		2, 569	21
Montana	8, 148	5, 648	654	1, 846	51	1, 737		17	7	34	
Nebraska	9, 752	4, 316	652	4, 784	84	4, 368			17	264	51
Nevada	3, 774	1, 902	131	1, 741		1, 662		26	2	51	
New Hampshire	2, 548	11	103	2, 434		1, 920	118	173	56	167	
New Jersey	1, 873	15	17	1, 841		216	31	84	353	1, 106	51
New Mexico	9, 334	5, 016	1, 647	2, 671		2, 585			1	85	
New York	14, 015	2, 720	51	11, 244		124	1, 672	3, 638	434	5, 133	243
North Carolina	8, 705	118	857	7, 730	2, 977	538	190	598	957	2, 434	36
North Dakota	7, 401	2, 679	1, 539	3, 183		3, 172			1	10	
Ohio	11, 343	27	62	11, 254		4, 108	1, 485	1, 591	435	2, 265	1, 420
Oklahoma	6, 395	2, 475	579	3, 341		1, 747			275	1, 279	40
Oregon	4, 352	339	409	3, 604		2, 380		324	684	216	
Pennsylvania	13, 501		4, 006	9, 495		852	2, 365	408	484	5, 018	368
Rhode Island	1, 009	257	181	571		26	106	204	124	111	
South Carolina	5, 993	887	240	4, 866	2, 842	514	43	11	445	1, 011	
South Dakota	5, 976	628	1, 364	3, 984	20	3, 911		8		45	
Tennessee	7, 044	447	637	5, 960		2, 534	1, 329	782	218	1, 080	17
Texas	18, 703	5, 485	2, 410	10, 808	935	6, 000	990	503	199	2, 123	58
Utah	3, 436	360	1, 172	1, 904		1, 605		5	67	227	
Vermont	4, 204	34	618	3, 552	1, 000	2, 168	49	73	3	259	
Virginia	7, 688	1, 511	575	5, 602	504	2, 201	1, 283	847	70	697	
Washington	3, 248	288	113	2, 847		2, 067			60	715	5
West Virginia	4, 164	608	469	3, 087		920	198	920	153	762	134
Wisconsin	10, 221		856	9, 365	46	5, 431	531	144	16	3, 196	1
Wyoming	3, 127	971	506	1, 650		1, 615			27	8	
Total, 1930	324, 496	69, 910	28, 365	226, 221	15, 152	106, 728	20, 229	14, 590	8, 071	58, 208	3, 243
Total—1929	314, 163	77, 259	28, 553	208, 324	15, 442	97, 838	19, 931	14, 043	7, 220	50, 584	3, 266
1928	306, 442	81, 549	31, 755	193, 138	13, 499	93, 124	18, 142	15, 200	6, 890	42, 957	3, 326
1927	293, 353	86, 817	29, 970	176, 566	12, 581	86, 095	17, 752	13, 496	6, 398	36, 915	3, 329
1926	287, 928	96, 413	28, 456	163, 059	11, 396	79, 286	18, 428	12, 927	5, 705	31, 936	3, 381
1925	274, 911	103, 271	26, 786	144, 854	11, 025	68, 771	16, 709	12, 105	5, 414	27, 645	3, 185
1924	261, 216	94, 651	34, 456	132, 109	10, 446	63, 158	17, 033	10, 346	5, 211	22, 825	3, 090
1923	251, 611	103, 843	36, 368	111, 400	8, 875	52, 917	15, 422	8, 847	4, 558	17, 916	2, 865
1921	209, 242	102, 963	21, 421	[1] 84, 858	8, 622	36, 458	16, 978	6, 749	2, 840	10, 114	2, 089

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[1] Includes 1,008 miles of miscellaneous surfacing not allocated by types.

TABLE 502.—*Total State highway income and funds available 1930, as reported by State authorities*

State	Total funds available	Balances at first of year	Total income for State highways	State taxes and appropriations	Motor vehicle fees	Gasoline tax receipts	From counties and miscellaneous	State highway bonds sold	Federal-aid road funds used
	1,000 dollars	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
Alabama	17, 655	3, 360	14, 295	--------	2, 851	3, 506	1, 070	5, 251	1, 617
Arizona	5, 330	457	4, 873	709	778	1, 662	66	--------	1, 658
Arkansas	48, 365	1, 147	47, 218	--------	2, 607	6, 729	54	35, 580	2, 248
California	49, 744	13, 646	36, 098	4, 597	4, 195	22, 433	941	--------	3, 932
Colorado	10, 086	2, 177	7, 909	471	834	4, 171	134	--------	2, 299
Connecticut	15, 890	1, 107	14, 783	--------	8, 430	4, 481	1, 383	--------	489
Delaware	8, 710	6	8, 704	5, 579	1, 611	1, 033	100	--------	381
Florida	10, 932	957	9, 975	--------	3, 376	4, 528	841	--------	1, 230
Georgia	14, 339	719	13, 620	--------	4, 190	8, 066	791	--------	573
Idaho	6, 780	459	6, 321	325	193	2, 959	828	1, 000	1, 016
Illinois	70, 108	6, 664	63, 444	167	18, 354	[1]40, 486	347	--------	4, 090
Indiana	24, 055	706	23, 349	--------	6, 019	[2]14, 194	1, 064	--------	2, 072
Iowa	56, 077	7, 281	48, 796	--------	11, 902	5, 965	264	[3]26, 789	3, 876
Kansas	19, 364	1, 537	17, 827	--------	5, 965	9, 047	442	--------	2, 373
Kentucky	28, 788	2, 737	26, 051	320	4, 148	8, 483	2, 080	8, 449	2, 571
Louisiana	33, 519	7, 573	25, 946	429	4, 632	7, 335	2, 106	11, 260	184
Maine	17, 711	1, 021	16, 690	1, 044	3, 103	4, 612	3, 380	3, 335	1, 216
Maryland	20, 148	4, 045	16, 103	2, 723	2, 458	5, 866	1, 922	2, 377	757
Massachusetts	29, 214	5, 345	23, 869	1, 150	7, 186	10, 505	3, 764	--------	1, 264
Michigan	51, 448	2, 851	48, 597	--------	22, 041	21, 825	2, 428	--------	2, 303
Minnesota	46, 670	11, 668	35, 002	1, 960	11, 008	9, 173	34	9, 177	3, 650
Mississippi	5, 298	790	4, 508	--------	72	2, 817	1, 157	--------	462
Missouri	48, 922	5, 826	43, 096	--------	10, 049	8, 789	723	20, 053	3, 482
Montana	6, 015	158	5, 857	--------	--------	2, 976	253	--------	2, 628
Nebraska	11, 469	870	10, 599	107	1, 275	7, 021	103	--------	2, 093
Nevada	2, 529	101	2, 428	106	366	675	161	--------	1, 120
New Hampshire	10, 995	2, 109	8, 886	--------	2, 057	2, 470	1, 964	1, 500	895
New Jersey	67, 744	9, 270	58, 474	11, 992	14, 097	10, 911	772	20, 001	701
New Mexico	9, 643	1, 025	8, 618	197	541	2, 737	142	3, 437	1, 564
New York	145, 158	75, 664	69, 494	6, 709	28, 261	21, 357	9, 549	--------	3, 618
North Carolina	29, 347	8, 561	20, 786	--------	7, 026	12, 895	154	--------	711
North Dakota	4, 195	359	3, 836	--------	978	1, 260	390	--------	1, 208
Ohio	49, 764	8, 976	40, 788	--------	6, 745	23, 064	6, 479	--------	4, 500
Oklahoma	21, 001	2, 284	18, 717	209	2, 917	8, 752	2, 376	--------	4, 463
Oregon	17, 025	1, 267	15, 758	--------	6, 228	6, 102	331	1, 532	1, 565
Pennsylvania	103, 895	29, 117	74, 778	--------	33, 828	28, 820	6, 405	--------	5, 725
Rhode Island	4, 493	1, 573	2, 920	322	1, 698	702	62	--------	136
South Carolina	38, 662	7, 032	31, 630	--------	2, 687	6, 484	1, 512	20, 475	472
South Dakota	9, 078	3, 326	5, 752	73	1, 557	2, 810	94	--------	1, 218
Tennessee	78, 959	23, 745	55, 214	656	4, 538	10, 016	1, 913	36, 631	1, 460
Texas	52, 299	10, 149	42, 150	--------	4, 626	21, 181	10, 412	--------	5, 931
Utah	5, 263	425	4, 838	--------	395	2, 439	1, 083	--------	921
Vermont	8, 811	1, 077	7, 734	822	2, 439	1, 875	1, 821	441	333
Virginia	21, 862	3, 758	18, 104	2, 550	6, 091	7, 724	643	--------	1, 091
Washington	15, 806	--------	15, 806	--------	8, 000	6, 456	93	--------	1, 254
West Virginia	32, 126	5, 918	26, 208	--------	4, 730	5, 441	--------	15, 000	1, 037
Wisconsin	33, 919	7, 178	26, 741	7	12, 038	7, 191	4, 446	--------	3, 059
Wyoming	3, 953	470	3, 483	94	682	1, 085	605	--------	1, 017
Total	1, 423, 164	286, 491	1, 136, 673	43, 318	289, 802	411, 109	77, 693	222, 288	92, 463

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[1] Includes taxes held by court, from 1927 $6,310,565, and 1929 $11,659,778.
[2] Includes loan by counties of their share of gasoline tax, $1,600,000.
[3] Issued by counties for State primary roads.

TABLE 503.—*Total State highway road and bridge disbursements, 1930, as reported by State authorities*

State	Grand total disbursements	Expenditures for State highway purposes						Other disbursements by State highway departments		
		Total expenditure for State highways	Construction and right of way	Maintenance	Miscellaneous expenses	Equipment, material, etc.	Interest on bonds	Retirement of bonds	County funds transfers	Other obligations assumed
	1,000 dollars	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
Alabama	15,373	13,902	9,383	1,610	2	595	2,312	1,445	--------	26
Arizona	5,233	5,050	3,426	1,466	--------	158	--------	--------	--------	183
Arkansas	39,821	29,963	24,630	2,954	--------	239	2,140	7,423	1,797	638
California	37,741	35,966	26,211	6,888	--------	46	2,821	1,775	--------	--------
Colorado	8,144	7,364	5,201	1,632	--------	266	265	780	--------	--------
Connecticut	15,288	14,351	11,261	2,856	--------	234	--------	--------	--------	937
Delaware	8,493	2,311	1,836	231	--------	52	192	5,685	--------	497
Florida	9,858	9,804	8,058	1,610	--------	136	--------	--------	--------	54
Georgia	12,699	12,699	9,284	2,012	22	1,344	37	--------	--------	--------
Idaho	6,637	6,197	4,359	1,370	--------	314	154	159	--------	281
Illinois	48,854	38,351	28,808	3,240	40	288	5,975	2,000	6,525	1,978
Indiana	22,569	22,556	17,213	4,646	--------	697	--------	--------	--------	13
Iowa	50,608	48,369	42,358	3,312	--------	--------	2,699	1,090	--------	1,149
Kansas	16,845	13,224	8,917	2,989	90	1,228	--------	--------	3,500	121
Kentucky	19,497	19,458	14,468	3,978	2	981	29	--------	15	24
Louisiana	29,357	28,717	22,976	4,067	--------	240	1,434	340	--------	300
Maine	17,184	14,743	10,004	3,126	47	806	760	631	--------	1,810
Maryland	17,992	14,442	10,943	2,157	73	417	852	1,871	--------	1,679
Massachusetts	21,926	14,928	11,554	3,076	--------	207	91	634	3,639	2,725
Michigan	46,136	33,910	24,612	6,554	241	254	2,249	1,833	10,339	54
Minnesota	39,365	24,318	17,651	4,764	--------	613	1,290	12,065	2,982	--------
Mississippi	4,588	4,567	1,998	2,360	2	207	--------	--------	1	20
Missouri	43,921	42,090	34,681	4,725	--------	112	2,572	1,000	--------	831
Montana	6,378	6,378	5,354	778	--------	246	--------	--------	--------	--------
Nebraska	11,087	11,015	7,631	3,384	--------	--------	--------	--------	--------	72
Nevada	2,710	2,497	1,875	515	--------	87	20	150	34	29
New Hampshire	9,640	9,063	2,917	5,927	--------	76	143	400	89	88
New Jersey	47,414	37,040	31,035	2,308	--------	32	3,665	3,947	6,427	--------
New Mexico	9,138	8,577	6,029	1,750	--------	295	503	561	--------	--------
New York	73,233	67,082	51,024	9,671	9	1,838	4,540	600	5,551	--------
North Carolina	25,613	19,028	9,148	4,959	144	--------	4,777	2,600	3,516	469
North Dakota	3,992	3,992	2,587	1,195	--------	210	--------	--------	--------	--------
Ohio	47,491	42,012	25,997	16,015	--------	--------	--------	--------	5,479	--------
Oklahoma	20,228	20,204	15,736	3,946	--------	522	--------	--------	--------	24
Oregon	14,668	11,794	7,881	2,493	--------	--------	1,420	1,925	--------	949
Pennsylvania	95,590	85,141	51,561	24,523	838	4,256	3,963	2,937	3,889	3,623
Rhode Island	3,367	2,840	1,614	905	--------	197	124	385	--------	142
South Carolina	22,753	17,656	14,612	2,069	39	636	300	--------	4,832	265
South Dakota	5,915	5,915	3,617	2,276	12	10	--------	--------	--------	--------
Tennessee	53,278	39,108	29,915	5,060	1	2,329	1,803	12,488	--------	1,682
Texas	47,332	46,596	32,950	12,159	351	1,136	--------	--------	--------	736
Utah	5,193	4,706	2,753	1,289	11	318	335	438	--------	49
Vermont	9,012	8,612	6,286	1,750	--------	306	270	400	--------	--------
Virginia	19,189	17,745	11,785	5,511	291	--------	158	1,000	--------	444
Washington	15,806	12,175	9,442	2,630	--------	103	--------	--------	3,631	--------
West Virginia	23,308	20,265	13,759	3,621	--------	205	2,680	2,833	--------	210
Wisconsin	25,623	19,806	15,528	4,263	12	3	--------	--------	4,652	1,165
Wyoming	3,590	3,471	2,249	1,064	--------	63	95	110	--------	9
Total	1,139,677	979,998	713,117	191,684	2,227	22,302	50,668	69,505	66,898	23,276

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TABLE 504.—*Mileage of county and local roads at end of 1930, from records and reports of local authorities*

State	Total mileage local roads	Earth nonsurfaced	Surfaced roads by types: Total surfaced mileage	Sand-clay top-soil	Gravel-chert, etc.	Water-bound macadam (treated and untreated)	Bituminous macadam	Bituminous concrete (includes sheet asphalt)	Portland cement concrete	Brick and block
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama	62, 381	46, 185	16, 196	8, 093	7, 523	292	79	86	117	6
Arizona	20, 185	18, 209	1, 976	383	1, 203	26	14	73	277	------
Arkansas	60, 039	58, 021	2, 018	210	1, 749	46	7	1	5	------
California	70, 375	49, 210	21, 165	------	11, 725	2, 057	3, 677	1, 297	2, 409	------
Colorado	59, 740	56, 527	3, 213	1, 381	1, 826	------	------	------	6	------
Connecticut	12, 022	10, 449	1, 573	------	985	396	91	8	91	2
Delaware	2, 962	2, 521	441	------	161	226	18	31	4	1
Florida	23, 703	12, 102	11, 601	3, 954	962	5, 312	108	694	57	514
Georgia	95, 160	84, 154	11, 006	9, 143	1, 291	75	264	31	200	2
Idaho	35, 260	28, 253	7, 007	2, 054	4, 895	------	46	8	4	------
Illinois	87, 398	72, 286	15, 112	------	12, 798	429	86	23	1, 658	118
Indiana	67, 657	21, 609	46, 048	------	42, 966	1, 126	322	188	1, 300	146
Iowa	95, 643	82, 091	13, 552	------	13, 544	------	------	------	8	------
Kansas	123, 550	120, 763	2, 787	500	2, 100	69	42	13	61	2
Kentucky	46, 261	36, 761	9, 500	165	3, 101	6, 132	71	7	24	------
Louisiana	25, 044	20, 390	4, 654	60	4, 570	11	5	7	1	------
Maine	18, 843	14, 502	4, 341	8	4, 295	13	18	------	6	1
Maryland	11, 594	8, 539	3, 055	------	1, 610	1, 115	20	1	309	------
Massachusetts	17, 178	9, 120	8, 058	17	5, 355	736	1, 425	414	93	18
Michigan	72, 997	54, 273	18, 724	84	15, 256	1, 398	217	194	1, 567	8
Minnesota	103, 770	73, 347	30, 423	5, 927	24, 234	101	2	29	130	------
Mississippi	55, 856	43, 243	12, 613	204	12, 155	18	57	78	95	6
Missouri	102, 094	93, 406	8, 688	1, 200	5, 543	1, 450	175	53	267	------
Montana	58, 924	56, 900	2, 024	120	1, 900	2	2	------	------	------
Nebraska	84, 155	82, 553	1, 602	500	1, 045	5	3	13	33	3
Nevada	19, 802	19, 099	703	38	652	------	11	------	2	------
New Hampshire	9, 486	8, 860	626	24	562	24	13	2	1	------
New Jersey	15, 520	7, 919	7, 601	162	3, 834	1, 155	661	926	811	52
New Mexico	38, 442	38, 099	343	78	265	------	------	------	------	------
New York	68, 360	45, 326	23, 034	------	10, 599	4, 147	6, 890	71	1, 303	24
North Carolina	45, 091	30, 865	14, 226	12, 595	850	175	137	231	204	34
North Dakota	99, 445	98, 602	843	------	843	------	------	------	------	------
Ohio	73, 763	34, 181	39, 582	------	30, 687	5, 115	2, 682	114	739	245
Oklahoma	114, 484	112, 518	1, 966	169	1, 674	2	11	14	96	------
Oregon	47, 265	36, 938	10, 327	350	8, 270	1, 200	------	350	157	------
Pennsylvania	77, 366	59, 780	17, 586	------	12, 491	2, 487	601	696	834	477
Rhode Island	1, 730	1, 209	521	------	278	124	102	13	3	1
South Carolina	51, 733	37, 797	13, 936	13, 197	572	7	10	52	95	3
South Dakota	114, 295	111, 183	3, 112	------	3, 112	------	------	------	------	------
Tennessee	60, 909	48, 851	12, 058	236	8, 296	2, 924	558	------	44	------
Texas	169, 836	154, 220	15, 616	2, 584	12, 300	467	40	46	179	------
Utah	20, 219	17, 672	2, 547	15	2, 432	------	5	45	50	------
Vermont	10, 827	9, 304	1, 523	144	1, 375	------	1	3	------	------
Virginia	52, 269	45, 290	6, 979	3, 849	1, 712	1, 320	83	------	15	------
Washington	40, 633	26, 610	14, 023	975	10, 275	1, 704	44	124	763	138
West Virginia	30, 635	28, 430	2, 205	------	655	690	461	83	255	61
Wisconsin	71, 563	51, 296	20, 267	3, 391	15, 542	951	------	------	383	------
Wyoming	38, 106	37, 769	337	97	240	------	------	------	------	------
Total	2, 684, 570	2, 217, 232	467, 338	71, 907	310, 308	43, 527	19, 059	6, 019	14, 656	1, 862
Total—1929	2, 710, 097	2, 255, 986	454, 111	75, 547	292, 463	48, 760	16, 692	5, 596	13, 254	1, 799
1928	2, 709, 839	2, 276, 840	432, 999	74, 562	277, 797	46, 454	14, 953	5, 235	12, 317	1, 681
1927	2, 720, 231	2, 308, 076	412, 155	71, 770	263, 088	45, 500	13, 525	5, 134	11, 438	1, 700
1926	2, 712, 262	2, 325, 257	387, 005	69, 711	245, 524	42, 732	11, 651	5, 155	10, 405	1, 827
1925	2, 731, 172	2, 354, 766	[1] 376, 406	58, 211	224, 036	65, 604	10, 490	5, 341	10, 106	2, 059
1924	2, 743, 195	2, 403, 637	[2] 339, 558	53, 638	193, 465	60, 139	7, 853	4, 480	8, 363	1, 624
1923	2, 744, 116	2, 416, 175	[3] 327, 941	52, 425	186, 314	59, 200	6, 950	4, 219	7, 289	1, 569
1921	2, 732, 052	2, 429, 150	[4] 302, 902	54, 717	163, 441	60, 367	3, 515	3, 739	5, 497	1, 331

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[1] Includes 559 miles of miscellaneous types.
[2] Includes 9,996 miles of miscellaneous types.
[3] Includes 9,975 miles of miscellaneous types.
[4] Includes 10,295 miles of miscellaneous types.

TABLE 505.—*Income and funds available for local roads, 1930, compiled from records of local authorities*

State	Total funds available	Balance at first of year	Total income for local roads	Local road bond sales	Local road taxes and appropriation	Motor-vehicle fees	Gasoline-tax receipts	Funds from State for local roads	Miscellaneous income
	1,000 dollars	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
Alabama	13,026	1,305	11,721	2,084	5,636	73	3,374	--------	554
Arizona	2,805	142	2,663	390	920	44	1,034	93	182
Arkansas	9,900	347	9,553	--------	2,100	1,027	6,368	--------	58
California	49,181	15,060	34,121	881	17,721	3,553	10,451	394	1,121
Colorado	6,316	434	5,882	23	3,001	627	1,587	315	329
Connecticut	3,897	85	3,812	--------	3,812	--------	--------	--------	--------
Delaware	2,048	272	1,776	--------	1,119	--------	--------	610	47
Florida	32,656	12,419	20,237	531	8,855	1,215	7,011	--------	2,625
Georgia	14,886	1,739	13,147	--------	9,635	--------	2,145	--------	1,367
Idaho	9,459	2,392	7,067	1,044	3,672	1,668	--------	341	342
Illinois	40,129	--------	40,129	1,350	19,600	--------	17,304	1,775	100
Indiana	47,519	10,256	37,263	8,110	24,900	--------	4,250	--------	3
Iowa	28,884	2,615	26,269	313	18,742	208	4,059	899	2,048
Kansas	22,895	3,500	19,395	1,639	13,051	1,750	1,750	--------	1,205
Kentucky	8,813	--------	8,813	2,000	6,000	563	--------	--------	250
Louisiana	12,950	3,038	9,912	500	9,250	--------	--------	--------	162
Maine	3,170	—34	3,204	40	3,064	--------	--------	--------	100
Maryland	6,021	—43	6,064	2,072	3,823	--------	--------	--------	169
Massachusetts	14,550	167	14,383	400	10,234	--------	--------	3,336	413
Michigan	58,286	12,070	46,216	7,100	25,500	6,000	4,624	1,542	1,450
Minnesota	27,004	1,201	25,803	1,045	17,846	--------	3,453	1,869	1,590
Mississippi	36,025	12,569	23,456	1,697	13,893	2,857	4,075	--------	934
Missouri	20,120	1,300	18,820	7,700	9,600	--------	--------	--------	1,520
Montana	5,022	325	4,697	100	2,820	1,527	--------	50	200
Nebraska	12,920	1,360	11,560	25	6,290	2,582	2,263	--------	400
Nevada	1,224	471	753	75	634	16	--------	18	10
New Hampshire	3,674	--------	3,674	--------	3,582	--------	--------	89	3
New Jersey	28,584	394	28,190	3,796	17,827	5,950	--------	477	140
New Mexico	501	69	432	--------	231	201	--------	--------	--------
New York	55,497	4,596	50,901	--------	33,567	6,088	5,695	5,551	--------
North Carolina	9,780	2,706	7,074	448	5,862	--------	--------	283	481
North Dakota	5,549	1,845	3,704	--------	2,276	783	645	--------	--------
Ohio	87,701	9,718	77,983	29,001	41,157	1,794	5,719	--------	312
Oklahoma	18,000	1,862	16,138	800	8,010	3,922	2,887	--------	519
Oregon	10,390	915	9,475	1,250	5,300	1,010	--------	1,215	700
Pennsylvania	89,308	18,409	70,899	5,420	47,570	--------	4,644	7,517	5,748
Rhode Island	1,225	15	1,210	105	1,094	--------	--------	--------	11
South Carolina	13,262	3,993	9,269	272	3,487	--------	1,414	--------	4,096
South Dakota	6,895	--------	6,895	282	5,208	1,405	--------	--------	--------
Tennessee	22,355	6,588	15,767	3,245	7,811	254	1,963	--------	2,494
Texas	43,000	10,862	32,138	4,000	19,050	8,964	--------	--------	124
Utah	2,297	356	1,941	193	1,604	--------	--------	--------	144
Vermont	1,000	--------	1,000	--------	700	--------	--------	300	--------
Virginia	9,590	1,520	8,070	212	4,437	--------	3,032	--------	389
Washington	12,526	1,480	11,046	100	6,800	830	2,416	400	500
West Virginia	14,218	3,038	11,180	1,072	10,103	--------	--------	--------	5
Wisconsin	47,529	4,055	43,474	5,370	26,499	--------	4,648	6,551	406
Wyoming	1,206	2	1,204	--------	740	--------	300	77	87
Total	973,793	155,413	818,380	94,685	494,633	54,911	107,111	33,702	33,338

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TABLE 506.—*Disbursements for local roads, 1930, compiled from records of local authorities*

State	Total disbursements	Expenditures for local road purposes					Other disbursements by local authorities	
		Total expenditures for local roads	Construction	Maintenance	Miscellaneous and overhead [1]	Interest on bonds	Principal payments on bonds	Funds transferred to State
	1,000 dollars	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
Alabama	12,094	10,957	3,204	6,105	10	1,638	763	374
Arizona	2,741	2,477	590	1,467	201	219	264	--------
Arkansas	9,140	4,440	1,700	--------	40	2,700	4,700	--------
California	34,470	31,276	10,153	14,130	4,082	2,911	3,085	109
Colorado	5,981	5,918	1,385	4,002	515	16	20	43
Connecticut	3,812	3,600	549	2,991	26	34	212	--------
Delaware	1,854	1,607	619	609	16	363	247	--------
Florida	21,281	17,257	2,507	5,774	1,761	7,215	2,232	1,792
Georgia	12,962	11,174	1,967	6,718	601	1,888	1,607	181
Idaho	7,030	5,212	1,557	1,347	1,478	830	1,446	372
Illinois	34,335	33,035	14,000	16,500	935	1,600	1,300	--------
Indiana	38,139	26,899	10,450	12,140	715	3,594	10,550	690
Iowa	26,018	24,440	9,174	12,975	1,501	790	1,578	--------
Kansas	21,045	19,321	11,100	5,027	2,260	934	1,300	424
Kentucky	8,256	6,175	1,075	3,250	600	1,250	650	1,431
Louisiana	9,650	6,850	1,200	3,300	400	1,950	2,800	--------
Maine	3,170	3,110	200	2,750	100	60	60	--------
Maryland	5,894	5,450	3,008	1,853	46	543	444	--------
Massachusetts	14,054	12,340	5,242	6,403	558	137	564	1,150
Michigan	48,610	41,425	20,400	15,600	2,425	3,000	6,310	875
Minnesota	25,982	24,143	15,542	5,341	2,458	802	1,149	690
Mississippi	25,868	22,010	5,494	13,562	229	2,725	3,262	596
Missouri	18,870	18,370	10,705	4,820	2,025	820	500	--------
Montana	4,950	4,200	1,200	2,200	300	500	700	50
Nebraska	11,240	11,067	5,893	4,280	675	219	70	103
Nevada	876	715	160	454	52	49	90	71
New Hampshire	3,674	2,092	250	1,492	350	--------	--------	1,582
New Jersey	28,289	24,291	10,749	7,075	1,634	4,833	3,998	--------
New Mexico	484	484	--------	467	17	--------	--------	--------
New York	55,000	54,800	28,880	22,204	294	3,422	200	--------
North Carolina	14,143	11,819	2,429	3,866	274	5,250	2,324	--------
North Dakota	3,936	3,600	2,555	780	250	15	200	136
Ohio	79,939	48,965	25,717	15,304	2,280	5,664	30,974	--------
Oklahoma	16,897	11,352	2,600	6,700	452	1,600	3,208	2,337
Oregon	10,180	9,180	6,000	2,000	380	800	1,000	--------
Pennsylvania	76,724	60,606	31,535	19,779	2,864	6,428	8,269	7,849
Rhode Island	1,217	1,139	305	438	354	42	78	--------
South Carolina	12,142	8,395	2,130	3,989	2	2,274	3,605	142
South Dakota	6,486	6,486	3,109	2,874	487	16	--------	--------
Tennessee	15,702	14,564	3,813	6,864	689	3,198	559	579
Texas	39,800	22,762	6,500	9,750	162	6,350	7,000	10,038
Utah	1,958	1,607	537	757	98	215	291	60
Vermont	1,000	593	188	400	--------	5	7	400
Virginia	8,915	7,963	--------	7,047	--------	919	949	--------
Washington	11,260	10,510	5,400	3,900	510	700	750	--------
West Virginia	11,255	11,041	5,029	3,957	--------	2,055	214	--------
Wisconsin	43,176	33,612	19,571	10,154	1,890	1,997	3,023	6,541
Wyoming	1,188	1,163	223	834	71	35	25	--------
Total	851,687	700,495	296,594	284,229	37,067	82,605	112,577	38,615

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[1] Administration and engineering included.

TABLE 507.—*Motor vehicle registration 1930, as reported by State authorities*

State	Registered motor vehicles (private and commercial)			Registered motor cycles	Tax-exempt motor vehicles	Number of licenses and permits		Year's increase in registration	
	All motor cars and trucks	Passenger autos, taxis and busses	Motor trucks and road tractors			Dealers' licenses	Operators' and chauffeurs' permits	Number	Per cent
Alabama	277,146	239,170	37,976	663	1,368	4,181	2,989	−8,387	−2.9
Arizona	110,525	98,480	12,045	390	1,457	117	13,468	1,512	1.4
Arkansas	220,204	193,218	26,986	380	939	481	5,137	−12,924	−5.5
California	2,041,356	1,810,969	230,387	9,405	18,122	3,325	----------	67,015	3.4
Colorado	308,509	276,847	31,662	1,059	283	3,474	7,296	5,020	1.7
Connecticut	331,026	279,830	51,196	2,371	2,390	3,178	409,557	2,963	0.9
Delaware	56,109	45,533	10,576	295	44	680	63,452	1,149	2.1
District of Columbia	156,676	139,733	16,943	903	3,412	1,759	71,743	5,226	3.4
Florida	327,801	274,705	53,096	1,490	3,871	1,724	2,514	−18,176	−5.2
Georgia	341,580	294,461	47,119	1,178	934	2,796	3,045	−17,325	−4.8
Idaho	119,077	104,526	14,551	359	1,329	441	923	1,003	0.8
Illinois	1,638,260	1,430,676	207,584	6,245	979	4,368	108,538	23,172	1.4
Indiana	875,763	747,366	128,397	2,862	8,593	2,706	58,847	9,048	1.0
Iowa	778,386	706,196	72,190	1,712	3,789	2,340	17,911	−6,064	−0.8
Kansas	594,523	511,384	83,139	1,275	2,833	2,607	----------	13,300	2.3
Kentucky	331,002	295,161	35,841	681	2,282	1,082	12,481	−1,846	−0.6
Louisiana	275,283	230,586	44,697	518	209	407	22,735	−5,585	−2.0
Maine	186,157	148,722	37,435	1,170	1,629	1,239	227,723	1,651	0.9
Maryland	321,702	283,870	37,832	1,941	2,000	5,788	82,468	1,829	0.6
Massachusetts	846,206	743,288	102,918	4,642	1,556	3,112	982,795	28,502	3.5
Michigan	1,328,209	1,161,051	167,158	3,530	371	2,034	70,710	−66,893	−4.8
Minnesota	732,972	624,902	108,070	1,825	3,680	1,991	----------	2,573	0.4
Mississippi	237,094	203,443	33,651	217	74	4,942	----------	−12,917	−5.2
Missouri	761,600	670,145	91,455	1,746	2,086	2,438	36,221	4,920	0.6
Montana	135,168	109,549	25,619	242	1,640	575	412	−5,219	−3.7
Nebraska	426,229	367,587	58,642	900	1,681	3,251	----------	8,003	1.9
Nevada	29,645	23,388	6,257	74	544	109	----------	−2,270	−7.1
New Hampshire	112,183	93,155	19,028	1,132	484	600	130,023	3,303	3.0
New Jersey	852,850	719,696	133,154	5,998	8,420	3,207	1,018,335	20,518	2.5
New Mexico	84,150	70,450	13,700	200	956	230	----------	5,776	7.4
New York	2,307,730	1,966,981	340,749	12,355	20,886	4,965	2,900,198	44,471	2.0
North Carolina	453,241	397,133	56,108	1,350	8,070	5,575	----------	−30,361	−6.3
North Dakota	183,019	155,383	27,636	235	3	650	----------	−5,027	−2.7
Ohio	1,759,363	1,555,093	204,270	6,886	13,854	3,772	60,925	−7,251	−0.4
Oklahoma	550,331	490,947	59,384	1,226	5,230	----------	----------	−20,460	−3.6
Oregon	252,123	234,766	17,357	1,348	3,003	517	26,705	−16,884	−6.3
Pennsylvania	1,753,521	1,534,834	218,687	12,961	2,478	10,704	2,181,006	20,238	1.2
Rhode Island	136,423	116,792	19,631	770	901	333	156,532	2,414	1.8
South Carolina	218,402	192,141	26,261	559	3,550	1,259	314,702	−12,872	−5.6
South Dakota	205,172	180,195	24,977	239	997	894	----------	973	0.5
Tennessee	368,259	330,436	37,823	1,228	4,552	628	----------	5,828	1.6
Texas	1,365,806	1,159,139	206,757	4,045	2,505	3,879	18,804	17,789	1.3
Utah	113,997	96,128	17,869	488	1,373	300	2,650	1,336	1.2
Vermont	86,624	78,398	8,226	524	28	363	97,699	−6,406	−6.9
Virginia	375,889	318,582	57,307	2,084	5,053	4,063	9,962	−11,316	−2.9
Washington	446,062	382,874	63,188	1,993	6,449	4,738	85,714	3,721	0.8
West Virginia	266,273	225,900	40,373	1,330	3,057	10,702	87,606	−2,615	−1.0
Wisconsin	782,562	677,452	105,110	2,666	5,225	2,912	79,059	−10,940	−1.4
Wyoming	61,501	51,579	9,922	121	591	352	----------	821	1.4
Total	26,523,779	23,042,840	3,480,939	107,811	[1] 173,619	121,788	9,370,885	22,336	0.08

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[1] Includes 7,859 United States Government-owned cars at large not allocated to states.

TABLE 508.—*Motor-vehicle revenues, 1930, as reported by State authorities*

State	Gross receipts	Motor-car registration receipts			Miscellaneous receipts	Disposition of gross receipts [1]			
		All motor cars	Passenger cars and busses	Trucks, etc.		Collection costs	State highways	Local roads	On road bonds and miscellaneous
	1,000 dollars	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*
Alabama	3, 800					226	890	741	1, 943
Arizona	735	540	313	227	195		735		
Arkansas	4, 284	4, 243			41	69	2, 875		1, 340
California	9, 859	8, 639	6, 202	2, 437	1, 220	1, 493	3, 388	3, 388	1, 590
Colorado	1, 901	1, 785	1, 416	369	116	131	8[illegible]5	885	
Connecticut	8, 290	6, 354	4, 878	1, 476	1, 936	716	7, 574		
Delaware	1, 110	864	636	228	246		598		512
District of Columbia	636	179	152	27	457	103			533
Florida	4, 814	4, 729	3, 546	1, 183	85	289	3, 394	1, 131	
Georgia	4, 482	4, 418	3, 606	812	64	211	4, 271		
Idaho	1, 998	1, 959	1, 549	410	39	60	194	1, 744	
Illinois	18, 444	17, 292	12, 858	4, 434	1, 152		10, 468		7, 976
Indiana	6, 347	5, 942	4, 533	1, 409	405	327	6, 020		
Iowa	12, 694	11, 978	10, 251	1, 727	716	613	11, 956		125
Kansas	6, 084					171	4, 163	1, 750	
Kentucky	5, 547	5, 376	4, 205	1, 171	171	275	4, 686	586	
Louisiana	4, 609	4, 528			81	50	4, 559		
Maine	3, 167	2, 423	1, 815	608	744	317	1, 443		1, 407
Maryland	3, 438	2, 713	2, 303	410	725	344	2, 475		619
Massachusetts	7, 121	4, 118	2, 884	1, 234	3, 003	1, 644	4, 841		636
Michigan	22, 482	20, 772	15, 999	4, 773	1, 710	875	14, 525	6, 000	1, 082
Minnesota	11, 062	10, 926	8, 937	1, 989	136		6, 977		4, 085
Mississippi	3, 046					160	241	2, 645	
Missouri	10, 150					499	6, 079		3, 572
Montana	1, 583	1, 503	1, 209	294	80	56		1, 527	
Nebraska	3, 805	3, 631	3, 117	514	174	117	1, 106	2, 582	
Nevada	374	287	206	81	87	14	190		170
New Hampshire	2, 290	1, 868			422	175	2, 115		
New Jersey	15, 382	11, 270	7, 241	4, 029	4, 112	1, 034	9, 362	4, 735	251
New Mexico	1, 280					78	445	204	553
New York	40, 858	36, 460	26, 546	9, 914	4, 398	2, 663	28, 261	6, 088	3, 846
North Carolina	6, 836					300	2, 848		3, 688
North Dakota	1, 959	1, 946	1, 518	428	13	77	1, 099	783	
Ohio	13, 287	12, 700			587	507	6, 383	6, 397	
Oklahoma	6, 536					256	2, 358	3, 922	
Oregon	9, 618	9, 060	7, 512	1, 548	558	555	2, 296	5, 316	3, 451
Pennsylvania	33, 112	23, 860	16, 109	7, 751	9, 252	2, 048	26, 514		4, 550
Rhode Island	2, 281	1, 834	1, 350	484	447	250	2, 014	17	
South Carolina	2, 878	2, 581	2, 130	451	297	41	2, 681		156
South Dakota	2, 960	2, 901	2, 463	438	59	92	1, 463	1, 405	
Tennessee	4, 767					89	2, 221	2, 220	237
Texas	13, 961	13, 061	9, 252	3, 809	900	844	4, 153	8, 964	
Utah	856					118	402		336
Vermont	2, 392	2, 058	1, 680	378	334		2, 392		
Virginia	6, 494	6, 235	5, 109	1, 126	259	212	6, 116		166
Washington	7, 617	7, 354	5, 745	1, 609	263	188	5, 279	2, 062	88
West Virginia	4, 703	4, 296	3, 332	964	407	210	1, 622		2, 871
Wisconsin	13, 084	12, 724	9, 123	3, 601	360	700	6, 898	5, 486	
Wyoming	692						692		
Total	355, 705					19, 197	222, 147	68, 578	45, 783

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[1] These figures do not always agree with those shown on highway income tables, because of time of disposition and use of fiscal years.

TABLE 509.—*Gasoline taxes, 1930, as reported by State authorities*

State	Total tax (refunds deducted)	Disposition of total taxes collected					Gallons consumed by motor vehicles	Tax rate per gallon
		Collection costs	Construction, etc.		State and county road-bond payments	Miscellaneous		
			State highways[1]	Local roads[1]				
	1,000 dollars	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 dollars*	*1,000 gallons*	*Cents*
Alabama	6,902	34	1,959	3,440	1,469		172,537	4
Arizona	2,670		1,683	987			66,750	4
Arkansas	6,427	48	4,505		1,803	71	128,545	5
California	34,870	52	23,212	11,606			1,162,338	3
Colorado	6,145	55	4,263	1,644		183	153,621	4
Connecticut	4,515		4,515				223,297	2
Delaware	1,013		864		149		33,779	3
District of Columbia	1,600					1,600	79,984	2
Florida	13,655	13	4,541	757	4,540	3,801	227,037	6
Georgia	13,435	4	8,954	2,239		2,238	223,185	6
Idaho	2,731	13	2,674		36	8	54,423	5
Illinois	27,472	61	18,274	9,137			915,747	3
Indiana	17,159	41	12,838	3,210		1,070	428,969	4
Iowa	10,584	32	5,243	5,309			352,802	3
Kansas	9,121		7,371	1,750			304,016	3
Kentucky	8,415	28	8,387				168,295	5
Louisiana	7,546		5,543		1,848	155	184,782	5
Maine	4,169	29	2,070	2,070			102,737	4
Maryland	6,991	9	5,526			1,456	174,780	4
Massachusetts	10,563	20	7,407	2,500	636		528,147	2
Michigan	21,714	42	11,508	6,624	3,000	540	722,463	3
Minnesota	10,359		6,906	3,453			345,304	3
Mississippi	6,918	7	2,848	3,855		208	135,824	5
Missouri	8,639	57	8,582				431,958	2
Montana	2,942	13	2,929				58,838	5
Nebraska	9,060	7	6,790	2,263			226,511	4
Nevada	675		675				16,875	4
New Hampshire	2,499		1,874		625		62,487	4
New Jersey	11,380	19	11,268			93	516,685	3
New Mexico	2,762	55	1,843		864		54,386	5
New York	28,476		21,320	5,685		1,471	1,438,583	2
North Carolina	12,533		8,845		3,688		250,669	5
North Dakota	1,972	25	1,290	645		12	65,643	3
Ohio	37,081		23,176	7,416		6,489	927,036	4
Oklahoma	12,092	62	9,022	3,008			302,310	4
Oregon	6,199	15	6,184				154,986	4
Pennsylvania	33,624	279	25,251	4,644	3,450		928,842	3
Rhode Island	1,736		1,302		434		86,613	2
South Carolina	7,146		3,476	1,191	2,479		119,072	6
South Dakota	3,504	13	2,715		776		87,597	4
Tennessee	10,719	54	6,399	2,133	2,133		214,384	5
Texas	29,527		22,145			7,382	738,177	4
Utah	2,106	4	1,663		439		60,138	3½
Vermont	1,880		1,880				46,998	4
Virginia	10,775		7,543	3,232			215,501	5
Washington	7,253		4,835	2,418			241,775	3
West Virginia	5,367		2,687		2,680		133,966	4
Wisconsin	8,315	11	3,058	4,647		599	415,742	2
Wyoming	1,447		1,085	362			36,175	4
Total	494,683	1,102	338,928	96,225	31,049	27,379	14,751,309	3.35

Board of Public Roads.

[1] These figures do not always agree with those shown on highway income tables because of time of disposition and use of fiscal years.

TABLE 510.—*Annual average rate in cents per hour for common labor employed on Federal-aid highway projects, 1922–1931*

Year	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific	United States
	Cents per hour	*Cents per hour*	*Cents per hour*	*Cents per hour*	*Cents per hour*	*Cents per hour*	*Cents per hour*	*Cents per hour*	*Cents per hour*	*Cents per hour*
1922	40	37	33	32	21	20	24	38	49	33
1923	53	47	41	36	27	23	25	41	54	39
1924	49	43	40	36	28	24	27	40	53	38
1925	46	43	37	37	27	25	26	44	52	38
1926	49	47	38	36	29	25	27	44	52	38
1927	49	47	39	37	28	25	30	45	53	40
1928	49	43	39	38	26	26	28	46	52	41
1929	51	43	39	37	28	26	31	47	53	39
1930	50	42	38	37	25	24	28	47	53	39
1931	45	37	36	35	22	20	23	45	51	36

Bureau of Public Roads.

TABLE 511.—*Fertilizer and fertilizer materials: Production, sales, and value in the United States, calendar years 1928–1930*

Item	Quantity			Value		
	1928	1929	1930	1928	1929	1930
Agricultural lime and liming materials sold: [1]						
Lime from limestone—	*Short tons*	*Short tons*	*Short tons*	*Dollars*	*Dollars*	*Dollars*
Quicklime	110,533	89,654	343,111	639,615	448,634	2,372,779
Hydrated	223,377	248,675		1,647,943	1,939,267	
Lime from oyster shells	15,371	14,000	----------	126,844	119,000	----------
Limestone, pulverized	2,186,870	2,654,580	----------	3,153,848	3,764,775	----------
Calcareous marl	61,034	38,990	----------	200,704	130,866	----------
Total	2,597,185	3,045,899	----------	5,768,954	6,402,542	----------
Phosphate rock sold or used: [2]						
Florida—	*Long tons*	*Long tons*	*Long tons*			
Hard rock	95,918	72,424	81,753	383,672	267,218	517,229
Land pebble	2,787,528	3,015,874	3,166,318	9,040,350	9,633,856	10,273,076
Total	2,883,446	3,088,298	3,248,071	9,424,022	9,901,074	10,790,305
Tennessee—						
Brown and blue rock	577,095	633,939	611,045	2,856,850	3,097,104	2,938,525
Other States	[3] 40,865	[4] 38,618	[4] 67,276	[3] 162,307	[4] 155,081	268,000
Total phosphate rock	3,501,406	3,760,855	3,926,392	12,443,179	13,153,259	13,996,830
Sulphur produced	1,981,873	2,362,389	2,558,981	----------	----------	----------
Sulphur sold [1]	2,082,924	2,437,238	1,989,917	[5] 37,500,000	[5] 43,800,000	[5] 35,800,000
Pyrites produced	312,815	333,465	347,512	1,081,758	1,250,141	1,028,680

Bureau of Agricultural Economics. Compiled from annual reports of the Bureau of the Census. Figures for earlier years appear in previous issues of the Yearbook.

[1] Sold by producers.
[2] Sold or used by producers.
[3] Idaho and Wyoming.
[4] Idaho, Wyoming, and Montana.
[5] Approximate.

TABLE 512.—*Fertilizer: Consumption in the United States by states, 1920–1931*

State and division	Calendar year [1]										
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
	1,000 short tons	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*	*1,000 short tons*
Maine	[2] 168	[2] 151	[2] 172	[2] 168	[2] 182	[2] 185	147	184	[3] 179	186	196
New Hampshire [2]	17	14	15	17	16	16	15	17	17	17	17
Vermont	[2] 20	[2] 15	[2] 16	[2] 18	[2] 17	[2] 18	[2] 18	16	17	15	16
Massachusetts	61	61	66	64	62	63	59	72	71	62	67
Rhode Island [3]	10	8	8	9	9	9	8	10	10	10	10
Connecticut	[3] 75	[3] 70	[2] 70	[2] 70	[2] 70	[2] 70	[2] 70	[2] 65	[2] 72	[2] 69	[4] 69
New York	[3] 250	[3] 230	[3] 250	[3] 250	[3] 250	253	234	260	[3] 260	[3] 250	[4] 250
New Jersey	165	163	177	157	153	147	135	142	144	142	156
Pennsylvania	333	321	322	309	320	328	329	327	340	332	[4] 332
North Atlantic	1,099	1,033	1,096	1,062	1,079	1,089	1,015	1,093	1,110	1,083	1,113
Ohio	300	255	311	303	321	322	305	313	321	339	327
Indiana [5]	232	188	209	198	192	226	228	240	221	250	224
Illinois	[3] 15	[3] 12	14	17	17	25	25	[3] 26	31	38	41
Michigan	113	83	86	84	95	109	105	117	[3] 150	[3] 153	[4] 130
Wisconsin	12	13	14	15	15	12	16	23	33	41	51
Minnesota	[3] 5	[3] 4	[3] 6	[3] 7	[3] 8	[3] 9	11	11	14	13	15
Iowa	[3] 4	[3] 3	[3] 4	[3] 4	[3] 5	[2] 6	[6] 6	[6] 7	[2] 10	[2] 17	[2] 25
Missouri [5]	93	51	50	52	47	64	57	56	65	59	60
Kansas	[3] 13	[3] 4	[3] 4	[3] 5	[3] 5	[2] 4	8	[3] 8	9	[5] 10	[5] 6
Other States	1	1	1	1	1	1	1	1	1	2	3
North Central	788	614	699	686	706	778	762	802	855	922	882
Delaware	62	38	40	37	36	41	43	41	41	41	43
Maryland	172	140	156	155	151	165	163	165	173	165	177
Virginia [5]	465	370	450	422	442	452	435	408	438	430	449
West Virginia [3]	35	29	38	40	40	41	43	44	50	50	50
North Carolina [5]	1,170	691	951	1,066	1,183	1,218	1,218	1,171	1,349	1,294	1,242
South Carolina [5]	1,099	599	527	693	844	873	840	727	788	760	749
Georgia [5]	1,003	536	522	676	679	779	780	713	883	869	929
Florida [5]	262	291	354	398	365	359	399	417	469	427	487
South Atlantic	4,268	2,694	3,038	3,487	3,740	3,928	3,921	3,686	4,191	4,036	4,126
Kentucky	90	62	85	90	85	93	92	70	90	93	114
Tennessee [5]	98	64	90	106	115	142	156	112	151	143	164
Alabama [5]	375	168	284	448	457	598	615	478	681	675	644
Mississippi [5]	131	61	143	208	206	258	278	219	333	328	404
Arkansas [5]	78	22	36	80	97	123	126	75	126	157	158
Louisiana [5]	111	36	75	105	125	111	114	93	144	174	176
Oklahoma	[3] 4	[3] 2	[3] 2	[3] 4	[3] 4	[2] 5	[2] 6	[2] 4	[5] 8	[5] 9	[5] 7
Texas [5]	55	22	34	79	128	101	125	81	145	192	145
South Central	942	437	749	1,120	1,217	1,431	1,512	1,132	1,678	1,771	1,812
Washington	[2] 6	[2] 5	[2] 4	[2] 5	[2] 7	[3] 10	12	14	[3] 16	[3] 17	[3] 17
Oregon	[3] 6	[3] 6	[3] 8	[3] 8	[3] 8	[3] 8	[3] 8	[3] 9	[2] 10	[2] 10	[2] 10
California	66	73	75	72	66	86	94	103	121	130	142
Other States	2	1	1	2	2	3	4	4	4	6	8
Western	80	85	88	87	83	107	118	130	151	163	177
United States	7,177	4,863	5,670	6,442	6,825	7,333	7,328	6,843	7,985	7,975	8,110

Bureau of Agricultural Economics. Rearranged from latest revised report of the National Fertilizer Association, published in the Fertilizer Review May–June, 1931. Based on fertilizer tag sales or sale records or estimates, as shown in footnotes.

[1] Except as follows: New Hampshire, Massachusetts, Idaho, and Oklahoma (1920–1927), year ended June 30; Rhode Island, year ended Mar. 31; New Jersey, year ended October 31.
[2] Estimated by State authorities.
[3] Estimated.
[4] Preliminary.
[5] Based on tag sales.
[6] Totals of 4 companies plus estimates for others.

TABLE 513.—*Fertilizer and fertilizer materials: Production, consumption, imports, and exports, United States, 1926–1930*

Item	Calendar year				
	1926	1927	1928	1929	1930[1]
Sulphate of ammonia (equivalent of all forms):	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*
Production[2]	690, 976	717, 460	798, 887	856, 214	769, 022
Sales[2]	682, 967	741, 866	764, 355	827, 674	746, 031
Imports for consumption	9, 392	19, 211	42, 133	21, 338	39, 160
Exports	202, 860	155, 335	104, 177	162, 132	91, 461
Nitrate of soda, imports for consumption	1, 024, 009	838, 636	1, 156, 860	1, 042, 113	643, 881
Sulphuric acid:					
Production[3]	1, 745, 759	1, 656, 871	2, 126, 860	2, 262, 784	2, 228, 588
Imports for consumption	27, 969	17, 434	13, 164	8, 104	459
Exports	4, 612	3, 756	3, 500	3, 480	2, 735
Consumption[3]	2, 058, 683	2, 137, 129	2, 440, 121	2, 445, 581	2, 476, 712
Superphosphate:					
Production[3]	3, 799, 054	3, 699, 579	4, 472, 341	4, 294, 967	4, 530, 521
Sales[3]	[4]3, 536, 552	1, 915, 913	1, 283, 732	1, 380, 565	1, 404, 041
Potash:					
Production, domestic	46, 324	76, 819	104, 129	107, 820	105, 810
Sales, domestic	51, 369	94, 722	105, 208	101, 370	98, 280
Imports for consumption—					
Kainit	203, 702	115, 345	119, 897	85, 042	125, 455
Manure salts[5]	354, 413	311, 357	453, 242	437, 727	405, 215
Muriate of potash	223, 049	183, 475	261, 644	258, 682	306, 017
Sulphate of potash	78, 258	77, 172	96, 833	89, 051	96, 603
Other potash-bearing substances[6]	52, 357	10, 531	12, 076	706	613
Total imports for consumption	911, 779	697, 880	943, 692	871, 208	933, 938

Bureau of Agricultural Economics. Compiled from Annual Reports of the Bureau of the Census, Bureau of Foreign and Domestic Commerce, and the Bureau of Mines.

[1] Subject to revision.
[2] By-product of coke ovens: Production from other sources (coal, gas, bone carbonizing, etc.) accounted for less than 5 per cent of the total production for these years.
[3] Fertilizer establishments only.
[4] Quantity sold as superphosphate or used in manufactured goods sold.
[5] Includes double manure salts and hard salts.
[6] Includes ashes (wood), beet root, other potash-bearing substances (alunite, leucite, etc.), used for fertilizer.

TABLE 514.—*Nitrogen: World production of, contained in inorganic nitrogenous materials, 1927–1931*

Product	Quantity produced during year ended May 31—				
	1927	1928	1929	1930	1931[1]
	Short tons	*Short tons*	*Short tons*	*Short tons*	*Short tons*
By-product sulphate of ammonia	361, 000	404, 800	413, 600	466, 900	395, 500
Other by-product ammonia[1]	55, 300	59, 400	56, 100	56, 500	34, 000
Cyanamide	198, 000	224, 400	231, 000	290, 100	221, 000
Synthetic sulphate of ammonia	330, 000	403, 700	533, 500	486, 300	384, 000
Nitrate of lime	89, 100	115, 500	149, 600	143, 500	121, 600
Other synthetic nitrogen[1]	201, 700	259, 600	401, 500	470, 000	432, 500
Chilean nitrate of soda	219, 500	429, 000	539, 000	510, 000	275, 000
Total	1, 454, 600	1, 896, 400	2, 324, 300	2, 423, 300	1, 863, 600

Bureau of Chemistry and Soils. British Sulphate of Ammonia Federation (Ltd.), annual report. Fertilizers are included in this table under the final form as sold, so that, for example, cyanamide if converted into sulphate of ammonia is included under synthetic sulphate of ammonia, or, if into ammophos, is included under other synthetic nitrogen.

[1] Including ammonia products used for industrial purposes and ammonia in mixed fertilizers.

TABLE 515.—*Insecticides and fungicides: Production, imports for consumption and domestic exports, 1926–1930*

Item	1926	1927	1928	1929	1930
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Arsenic, white:					
Production		35, 315, 909		41, 093, 066	
Imports for consumption	15, 406, 890	25, 033, 649	22, 305, 972	26, 314, 042	20, 942, 663
Calcium arsenate:					
Production	[1] 5, 363, 320	27, 282, 326		31, 314, 176	
Imports for consumption	1, 057	3, 807	1, 323		6, 359
Exports			1, 178, 702	3, 139, 633	3, 177, 335
Lead arsenate:					
Production	[1] 16, 898, 214	21, 527, 838		29, 903, 552	
Imports for consumption				200	800
Exports			1, 093, 673	1, 563, 982	2, 270, 980
Sulphate of copper: [2]					
Production	33, 353, 264	36, 039, 487	44, 463, 000	40, 258, 860	[3] 36, 937, 300
Imports for consumption	2, 558, 584	1, 978, 726	3, 611, 844	5, 388, 743	5, 964, 378
Exports	4, 798, 620	6, 206, 904	8, 666, 899	6, 419, 688	5, 061, 554
Tobacco extract, exports [4]		2, 297, 016	2, 386, 526	2, 294, 567	1, 929, 171
Sodium arsenate, imports for consumption	116, 262	90, 454	12, 403		94, 051
Prepared animal dips:					
Imports for consumption [5]	119, 947	102, 394	175, 055	208, 770	174, 215
Exports				2, 252, 644	1, 258, 139

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census, Bureau of Mines and Bureau of Foreign and Domestic Commerce.

[1] Year ended June 30. Not comparable with census years 1927, 1929, which cover more industries, therefore are more accurate.
[2] Copper industry only. The total production as reported by the census for 1927 and 1929 was: 56,666,812 pounds and 79,187,343 pounds, respectively.
[3] Estimated.
[4] Nicotine sulphate and "Other tobacco extracts."
[5] Classified as sheep dip.

TABLE 516.—*Insecticides and fungicides: Average wholesale price per pound New York, 1919–1931* [1]

Calendar year	Arsenic, white	Calcium arsenate	Lead arsenate		Paris green	Bordeaux mixture		Lime-sulphur solution, per gallon
			Powder	Paste		Powder	Paste	
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1919	9. 9		29. 9	14. 9	35. 8	16. 5	12. 4	19. 1
1920	13. 8		26. 3	13. 3	36. 2	19. 3	13. 2	18. 8
1921	7. 9	19. 1	19. 4	11. 6	27. 0	17. 2	10. 9	16. 6
1922	8. 9	13. 7	14. 8	11. 1	22. 6	16. 8	10. 8	16. 5
1923	14. 2	16. 4	22. 2	15. 7	30. 4	22. 0	16. 3	16. 5
1924	9. 4	10. 6	20. 9	13. 1	28. 8	16. 3	12. 5	16. 5
1925	5. 1	7. 8	15. 6	11. 0	21. 5	13. 2	11. 0	16. 5
1926	3. 8	8. 0	14. 6	11. 0	18. 4	11. 5	11. 0	14. 7
1927	4. 0	7. 5	13. 8		19. 2	11. 5	11. 0	15. 5
1928	4. 4	6. 8	14. 1		27. 0	11. 3	10. 9	15. 5
1929	4. 5	7. 4	13. 5		30. 9	11. 3	10. 7	15. 2
1930	4. 5	8. 1	14. 5		35. 2	13. 0	13. 0	15. 2
1931	4. 5	6. 5	12. 6		32. 5	12. 8	12. 8	15. 2

Bureau of Agricultural Economics. Compiled from the Oil, Paint, and Drug Reporter.

[1] Average of monthly range.

TABLE 517.—*Number of marketing and purchasing associations, estimated membership, and estimated amount of business, by geographic divisions and States, 1930–31*

Geographic division and State	Cotton and cotton products			Dairy products			Forage			Fruits and vegetables			Grain			Livestock			Nuts		
	No.[1] listed	Estimated membership	Estimated business (thousands)	No.[1] listed	Estimated membership	Estimated business (thousands)	No.[1] listed	Estimated membership	Estimated business (thousands)	No.[1] listed	Estimated membership	Estimated business (thousands)	No.[1] listed	Estimated membership	Estimated business (thousands)	No.[1] listed	Estimated membership	Estimated business (thousands)	No.[1] listed	Estimated membership	Estimated business (thousands)
United States	261	190, 000	$130, 000	2, 391	725, 000	$620, 000	8	1, 000	$1, 200	1, 386	182, 000	$319, 000	3, 448	775, 000	$621, 000	2, 014	400, 000	$300, 000	71	17, 000	$13, 000
New England				56	36, 250	63, 090				33	1, 810	3, 800	1	300	140	2	140	170			
Maine				3	370	400				17	470	750									
New Hampshire				2	180	400				1	30	30	1	300	140	1	40	10			
Vermont				35	6, 820	11, 150				1	40	10									
Massachusetts				10	24, 750	38, 200				13	1, 230	3, 000				1	100	160			
Rhode Island				2	170	640															
Connecticut				4	3, 960	12, 300				1	40	10									
Middle Atlantic				72	108, 900	164, 500				82	10, 640	12, 830	3	950	1, 920	4	410	4, 000			
New York				42	61, 800	124, 500				59	6, 600	5, 370	1	100	1, 090	2	130	2, 000			
New Jersey										10	2, 330	2, 550									
Pennsylvania				30	47, 100	40, 000				13	1, 710	4, 910	2	850	830	2	280	2, 000			
East North Central				1, 055	203, 650	180, 620				120	13, 060	15, 440	900	225, 200	150, 950	760	178, 500	117, 000			
Ohio				31	32, 700	25, 850				14	1, 800	5, 060	194	53, 200	29, 850	65	27, 500	19, 000			
Indiana				31	16, 400	6, 270				4	560	160	120	40, 100	15, 620	93	20, 000	14, 000			
Illinois				71	34, 400	45, 300				25	1, 200	780	445	82, 300	83, 300	330	68, 000	54, 000			
Michigan				72	43, 600	31, 100				56	6, 600	5, 800	90	33, 400	16, 680	84	25, 000	11, 000			
Wisconsin				850	76, 550	72, 100				21	2, 900	3, 640	51	16, 200	5, 500	188	38, 000	19, 000			
West North Central	4	150	300	1, 009	296, 910	139, 660				110	14, 920	10, 630	2, 179	467, 400	381, 460	1, 139	195, 900	159, 200			
Minnesota				649	114, 500	82, 800				25	4, 250	2, 850	316	74, 000	45, 150	355	63, 500	50, 000			
Iowa				257	68, 650	38, 750				3	410	230	369	82, 200	72, 550	393	65, 500	62, 000			
Missouri	4	150	300	14	19, 100	5, 650				64	7, 600	2, 980	150	43, 000	23, 300	158	33, 500	21, 000			
North Dakota				22	3, 930	1, 000				6	430	400	400	83, 300	59, 460	76	8, 500	3, 200			
South Dakota				26	19, 750	4, 220				2	110	130	242	51, 800	39, 420	70	9, 500	9, 000			
Nebraska				35	69, 100	6, 720				7	1, 720	3, 120	347	72, 400	66, 760	46	7, 500	9, 000			
Kansas				6	1, 880	520				3	400	920	355	60, 700	74, 820	41	7, 900	5, 000			

South Atlantic	42	33,000	28,200	29	12,850	16,640				200	28,420	41,260	6	9,350	1,970	33	5,840	1,240	11	4,810	380
Delaware										4	100	100									
Maryland				7	4,150	9,050				14	3,160	1,680	4	9,200	1,860						
Dist. Columbia				1	1,250	5,450															
Virginia				12	4,010	1,430				15	7,860	9,140	1	130	100	7	1,600	610	2	2,550	120
West Virginia				1	20	70				11	350	760				20	2,870	400			
North Carolina	13	12,900	9,200	7	3,350	630				8	800	830	1	20	10	1	90	20			
South Carolina	8	5,200	6,800							14	2,100	5,380							1	290	20
Georgia	21	14,900	12,200							15	4,550	1,370				4	1,200	190	8	1,970	240
Florida				1	70	10				119	9,500	22,000				1	80	20			
East South Central	25	50,000	35,000	24	7,360	2,560				94	12,500	6,380	4	610	260	25	5,260	3,920	6	1,270	340
Kentucky				4	2,890	30				17	3,450	2,300	2	470	210	7	1,660	2,700			
Tennessee	5	6,400	6,800	15	3,380	1,640				42	4,200	950	2	140	50	7	1,050	250			
Alabama	14	30,500	9,700	3	250	190				21	2,750	1,500				9	2,250	930	2	950	140
Mississippi	6	13,100	18,500	2	840	700				14	2,100	1,630				2	300	40	4	320	200
West South Central	182	104,500	64,100	16	5,570	1,570	2	200	115	157	19,100	14,350	103	30,270	33,120	17	2,360	1,990	13	620	190
Arkansas	7	2,100	100							86	8,300	3,740	3	300	1,470	8	1,190	220			
Louisiana	7	6,400	7,200							25	5,200	4,540	3	770	5,300				1	10	10
Oklahoma	93	48,900	14,200	9	2,870	1,130				11	1,100	450	81	24,000	15,120	3	270	370	4	260	40
Texas	75	47,100	42,600	7	2,700	440	2	200	115	35	4,500	5,620	16	5,200	11,230	6	900	1,400	8	350	140
Mountain	7	1,650	1,600	41	19,860	7,790	4	500	645	94	21,050	26,190	143	28,000	25,960	27	4,560	4,090			
Montana				7	2,550	650				5	2,530	1,070	67	10,400	10,820	15	2,930	850			
Idaho				13	11,260	5,350				16	1,420	1,920	17	4,200	5,180	2	230	130			
Wyoming				3	210	130				4	380	430	7	1,160	1,250	1	100	110			
Colorado				7	2,850	300	1	100	15	46	11,300	16,370	42	10,800	8,180	9	1,300	3,000			
New Mexico	5	1,100	1,500	2	530	220	2	300	425	3	170	170	5	590	370						
Arizona	2	550	100	1	20	10	1	100	205	5	550	1,550									
Utah				8	2,440	1,130				13	4,600	4,670	4	450	60						
Nevada										2	100	10	1	400	100						
Pacific	1	700	800	89	33,650	43,570	2	300	440	496	60,500	188,120	109	12,920	25,220	7	7,030	8,390	41	10,300	12,090
Washington				26	15,200	14,650				74	9,550	22,410	63	7,700	14,100	1	150	10			
Oregon				39	8,350	5,340				62	7,950	13,110	24	2,220	2,220	2	1,080	160	7	870	310
California	1	700	800	24	10,100	23,580	2	300	440	360	43,000	152,600	22	3,000	8,900	4	5,800	8,220	34	9,430	11,780

[1] Including federations, sales agencies, and subsidiaries.

TABLE 517.—*Number of marketing and purchasing associations, estimated membership, and estimated amount of business, by geographic divisions and states, 1930–31*—Continued

Geographic division and State	Poultry and Poultry products			Tobacco			Wool and Mohair			Miscellaneous selling			Miscellaneous buying			Totals		
	No. listed	Estimated membership	Estimated business (thousands)	No. listed	Estimated membership	Estimated business (thousands)	No. listed	Estimated membership	Estimated business (thousands)	No. listed	Estimated membership	Estimated business (thousands)	No. listed	Estimated membership	Estimated business (thousands)	Number listed	Estimated membership	Estimated business (thousands)
United States	160	82,000	$86,000	13	40,000	$7,000	136	64,000	$26,000	474	132,000	$61,800	1,588	392,000	$215,000	11,950	3,000,000	$2,400,000
New England	4	520	1,190				6	830	60	15	800	540	91	47,250	21,880	208	87,900	90,870
Maine							1	760	50	2	160	80	28	7,400	3,750	51	9,160	5,030
New Hampshire													9	2,200	2,020	14	2,750	2,600
Vermont										9	400	410	1	240	40	46	7,500	11,610
Massachusetts	1	20	370				5	70	10	3	130	30	17	35,020	14,000	50	61,320	55,770
Rhode Island										1	110	20	2	160	110	5	440	770
Connecticut	3	500	820										34	2,230	1,960	42	6,730	15,090
Middle Atlantic	13	800	7,880	3	100	40	43	3,300	310	25	3,780	2,530	233	61,250	50,070	478	190,130	244,080
New York	9	380	6,370				20	700	180	7	850	480	120	45,100	41,400	260	115,660	181,390
New Jersey	4	420	1,510							5	330	920	25	5,550	3,810	44	8,630	8,790
Pennsylvania				3	100	40	23	2,600	130	13	2,600	1,130	88	10,600	4,860	174	65,840	53,900
East North Central	10	3,210	1,300	2	9,000	2,200	6	8,400	1,540	112	39,790	13,490	336	93,200	41,130	3,301	774,010	523,670
Ohio	1	90	90				1	6,200	1,300	6	1,400	1,580	49	16,500	7,300	361	139,390	90,030
Indiana	4	1,620	600	1	2,000		2	420	80	11	3,740	1,860	66	20,500	10,180	332	105,340	48,770
Illinois	3	900	400							19	19,950	1,310	62	29,900	7,130	955	236,650	192,220
Michigan	1	500	180				1	1,050	90	47	8,550	6,100	42	7,300	4,120	393	126,000	75,070
Wisconsin	1	100	30	1	7,000	2,200	2	730	70	29	6,150	2,640	117	19,000	12,400	1,260	166,630	117,580
West North Central	23	19,230	11,520	1	300	50	12	29,000	2,330	146	38,890	20,290	642	128,850	55,030	5,265	1,191,550	780,470
Minnesota	1	30	10				5	3,300	380	11	2,500	1,360	171	37,500	11,430	1,533	299,580	193,980
Iowa	2	650	130				2	15,200	270	6	750	780	127	28,500	11,320	1,159	261,860	186,030
Missouri	16	16,600	11,150	1	300	50	3	6,500	800	105	29,650	13,850	130	19,800	15,500	645	176,200	94,580
North Dakota							1	2,000	230	5	630	320	26	3,100	1,440	536	101,890	66,050
South Dakota							1	2,000	650	4	1,530	1,180	35	6,400	2,160	380	91,090	56,760
Nebraska	4	1,950	230							5	1,620	1,180	85	22,550	8,650	529	176,840	95,660
Kansas										10	2,210	1,620	68	11,000	4,530	483	84,090	87,410

South Atlantic	21	2,230	920	2	9,800	4,260	7	2,330	100	34	10,660	11,010	87	15,300	13,090	472	134,590	119,070
Delaware	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4	100	100
Maryland	-----	-----	-----	1	5,300	3,520	3	430	30	1	100	50	17	3,350	2,810	47	25,690	19,000
District of Columbia	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1	1,250	5,450
Virginia	1	20	30	-----	-----	-----	1	100	10	5	1,280	260	34	8,800	7,740	78	26,350	19,440
West Virginia	2	500	170	-----	-----	-----	3	1,800	60	3	1,480	1,690	10	1,100	540	50	8,120	3,690
North Carolina	6	660	180	-----	-----	-----	-----	-----	-----	13	4,150	2,300	13	820	600	62	22,790	13,770
South Carolina	-----	-----	-----	1	4,500	740	-----	-----	-----	1	500	20	1	100	20	26	12,690	12,980
Georgia	6	590	90	-----	-----	-----	-----	-----	-----	7	1,840	550	6	570	1,030	67	25,620	15,670
Florida	6	460	450	-----	-----	-----	-----	-----	-----	4	1,310	6,140	6	560	350	137	11,980	28,970
East South Central	11	10,100	820	5	20,800	450	19	3,360	290	65	21,980	5,520	31	12,210	4,840	309	145,450	60,380
Kentucky	2	190	20	5	20,800	450	7	1,250	80	3	510	30	8	1,380	440	55	32,600	6,260
Tennessee	2	230	20	-----	-----	-----	10	2,000	120	17	3,380	1,180	9	8,150	1,040	109	29,930	12,050
Alabama	4	9,370	690	-----	-----	-----	2	110	90	22	5,840	2,630	8	1,040	3,120	85	53,060	18,990
Mississippi	3	310	90	-----	-----	-----	-----	-----	-----	23	12,250	1,680	6	1,640	240	60	30,860	23,080
West South Central	24	3,140	830	-----	-----	-----	8	3,360	5,810	30	8,180	3,980	67	18,560	6,460	619	195,860	132,515
Arkansas	2	20	10	-----	-----	-----	2	160	10	4	780	270	10	1,440	430	122	14,290	6,250
Louisiana	6	250	20	-----	-----	-----	-----	-----	-----	5	2,810	610	2	9,410	1,180	49	24,850	18,860
Oklahoma	2	70	40	-----	-----	-----	-----	-----	-----	7	1,130	1,950	20	3,000	1,960	230	81,600	35,260
Texas	14	2,800	760	-----	-----	-----	6	3,200	5,800	14	3,460	1,150	35	4,710	2,890	218	75,120	72,145
Mountain	35	16,970	10,940	-----	-----	-----	31	9,710	13,030	33	6,580	3,780	45	9,400	3,370	460	118,280	97,395
Montana	10	2,120	210	-----	-----	-----	10	3,500	3,400	5	310	70	13	1,360	630	132	25,700	17,700
Idaho	4	4,060	1,640	-----	-----	-----	6	1,050	1,900	6	2,430	1,380	6	2,300	480	70	26,950	17,980
Wyoming	7	1,410	210	-----	-----	-----	4	1,100	1,400	3	1,230	820	4	700	520	33	6,290	4,870
Colorado	7	2,850	670	-----	-----	-----	4	1,500	2,100	7	540	620	11	3,740	1,190	134	34,980	32,445
New Mexico	1	20	10	-----	-----	-----	1	610	1,400	4	170	90	2	620	230	25	4,110	4,415
Arizona	1	10	10	-----	-----	-----	1	100	320	4	880	620	3	280	190	18	2,490	3,005
Utah	2	6,200	7,960	-----	-----	-----	4	1,720	2,200	4	1,020	180	5	370	120	40	16,800	16,320
Nevada	3	300	230	-----	-----	-----	1	130	310	-----	-----	-----	1	30	10	8	960	660
Pacific	19	25,800	50,600	-----	-----	-----	4	3,710	2,530	14	1,340	660	56	5,980	19,130	838	162,230	351,550
Washington	5	13,900	20,870	-----	-----	-----	1	50	10	4	230	70	34	950	3,350	208	47,730	75,470
Oregon	3	2,900	2,340	-----	-----	-----	2	3,400	1,780	5	690	240	7	730	780	151	28,190	26,280
California	11	9,000	27,390	-----	-----	-----	1	260	740	5	420	350	15	4,300	15,000	479	86,310	249,800

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TABLE 518.—*Associations marketing dairy products: Number listed and estimated business, 1925, 1926, 1928, 1929, and 1930*

Calendar year	Creamery associations		Cheese-making associations		Milk-distributing associations		Milk-bargaining associations		Miscellaneous associations [1]		Total associations	
	Listed	Estimated business	Listed	Estimated business	Listed	Estimated business	Listed	Estimated business	Listed	Estimated business [2]	Listed	Estimated business
	Number	*1,000 dollars*	*Number*	*1,000 dollars*	*Number*	*1,000 dollars*	*Number*	*1,000 dollars*	*Number*	*1,000 dollars*	*Number*	*1,000 dollars*
1925	1,400	222,000	600	25,000	[3] 140	160,000	40	125,000	17	3,000	2,197	535,000
1926	1,390	230,000	751	32,000	119	135,000	40	192,000	179	11,000	2,479	600,000
1928	1,400	245,000	740	30,000	114	150,000	47	200,000	199	15,000	2,500	640,000
1929	1,385	264,804	717	27,931	111	138,694	50	229,251	195	19,320	2,458	680,000
1930	1,366	219,870	731	21,790	101	142,130	50	227,460	187	28,750	2,435	640,000

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[1] Including federations, sales agencies, warehouse associations, associations manufacturing ice cream, milk powder, etc.
[2] Not including amounts reported by federations, sales agencies, etc.
[3] Including associations marketing cream. In subsequent years these were included among the miscellaneous associations.

TABLE 519.—*Number of active wheat pools, quantity of wheat handled, and percentage which pool wheat was of total wheat,[1] 1921–22 to 1928–29*

Marketing season	Pools reporting	Wheat received by pools	Percentage pool wheat is of total wheat [1]	Marketing season	Pools reporting	Wheat received by pools	Percentage pool wheat is of total wheat [1]
	Number	*Bushels*	*Per cent*		*Number*	*Bushels*	*Per cent*
1921–22	3	11,372,768	2.3	1926–27	9	17,494,726	3.0
1922–23	10	20,293,610	3.5	1927–28	8	12,335,546	1.9
1923–24	11	24,446,621	4.8	1928–29	7	14,879,859	2.2
1924–25	10	27,967,244	4.4	1929–30	8	17,573,537	3.1
1925–26	9	16,823,560	3.5	1930–31	9	24,206,974	4.7

Federal Farm Board.

[1] Shipped out of country where grown. Yearbook, 1931: 592, Table 11.

TABLE 520.—*Cooperative citrus-fruit shipments and such shipments as a percentage of production for specified areas, 1920–21 to 1930–31*

Marketing season	Packed boxes handled by associations in—							
	California and Arizona		Alabama and Florida		Texas		United States	
	Boxes	*Per cent* [1]	*Boxes*	*Per cent* [1]	*Boxes*	*Per cent* [1]	*Boxes*	*Per cent* [1]
1920–21	21,806,253	81.8	3,905,841	27.9			25,712,094	63.2
1921–22	12,847,455	74.8	3,908,395	27.6			16,755,850	53.3
1922–23	19,810,048	82.5	5,443,758	30.3			25,253,806	59.9
1923–24	21,671,344	69.1	5,548,241	25.8	26,570	37.4	27,246,155	51.3
1924–25	17,635,860	74.3	6,375,759	31.6	65,690	29.5	24,077,309	54.4
1925–26	23,011,773	71.7	4,193,316	25.4	38,624	18.4	27,243,713	55.7
1926–27	25,427,062	69.3	4,860,948	26.2	95,053	26.4	30,383,063	54.4
1927–28	21,810,826	72.8	3,876,577	25.0	124,115	23.9	25,811,518	55.8
1928–29	32,129,643	67.1	7,268,739	28.5	262,459	31.2	39,660,841	53.2
1929–30	22,930,811	72.5	5,549,105	32.2	453,043	32.2	28,932,959	57.3
1930–31	31,879,555	77.1	10,277,883	38.8	363,430	45.0	42,517,868	46.0

Federal Farm Board.

[1] Per cent of production for the specified area.

TABLE 521.—*Livestock handled, sales, and purchases by terminal market cooperative sales agencies, 1918–1931*

Calendar year	Receipts of livestock [1]					Livestock purchased	
	Associations reporting	Cattle and calves	Hogs	Sheep	Total [2]	Associations reporting	Animals
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
1918	3	30, 528	139, 483	7, 548	189, 283	1	252
1919	4	63, 876	381, 127	23, 940	563, 383	2	8, 504
1920	4	85, 313	536, 380	29, 676	748, 255	2	6, 550
1921	6	163, 361	912, 095	103, 101	1, 310, 628	3	42, 032
1922	16	736, 982	3, 414, 016	352, 861	4, 727, 056	4	86, 350
1923	23	1, 409, 322	7, 732, 437	733, 552	9, 933, 445	8	103, 928
1924	26	1, 893, 326	9, 239, 070	1, 202, 616	11, 382, 304	14	242, 039
1925	28	1, 881, 241	7, 377, 084	1, 350, 311	10, 666, 069	18	288, 150
1926	27	2, 003, 014	6, 687, 296	1, 581, 882	10, 333, 307	18	328, 016
1927	28	1, 678, 094	7, 149, 561	1, 598, 465	10, 426, 120	21	280, 808
1928	28	1, 751, 599	8, 483, 413	1, 686, 889	11, 921, 901	18	325, 267
1929	28	1, 904, 066	8, 054, 184	2, 093, 136	12, 051, 386	20	[3] 577, 646
1930	30	2, 088, 411	7, 259, 731	2, 609, 604	11, 957, 746	22	723, 422
1931	34	2, 201, 994	7, 083, 563	2, 969, 464	12, 255, 021	23	634, 835

Calendar year	Total livestock handled		Value of sales [3]	Value of purchases	Value of business handled	
	Associations reporting	Animals [4]			Associations reporting	Total [5]
	Number	*Number*	*Dollars*	*Dollars*	*Number*	*Dollars*
1918	3	189, 535	12, 384, 348	15, 901	4	12, 400, 249
1919	4	571, 887	35, 178, 255	622, 335	6	35, 800, 590
1920	4	754, 805	37, 419, 935	458, 824	6	37, 878, 759
1921	6	1, 352, 660	35, 309, 401	894, 972	6	36, 204, 373
1922	16	4, 813, 406	101, 818, 588	3, 069, 638	18	104, 888, 226
1923	23	10, 037, 373	191, 954, 106	4, 631, 630	23	196, 904, 508
1924	26	11, 624, 343	231, 372, 776	5, 222, 121	24	236, 594, 897
1925	28	10, 954, 219	271, 797, 282	7, 923, 372	24	279, 720, 654
1926	27	10, 661, 323	278, 900, 462	8, 249, 106	24	293, 249, 470
1927	28	10, 793, 681	145, 202, 942	3, 036, 904	28	274, 209, 285
1928	28	12, 339, 000	279, 674, 261	8, 741, 163	28	289, 152, 931
1929	28	[5] 12, 755, 647	302, 894, 934	[5] 11, 627, 701	28	314, 522, 635
1930	30	12, 857, 965	263, 679, 996	10, 008, 169	30	273, 688, 165
1931	34	13, 045, 854	173, 268, 784	6, 766, 706	34	180, 601, 072

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[1] Includes some animals sold for yard traders.
[2] Includes animals not segregated by kind.
[3] Includes animals handled from producers to feeders.
[4] Includes transactions for yard traders.
[5] Includes business not classified as sales or purchases.

TABLE 522.—*Cooperative extension workers:*[1] *Number employed, United States, June 30, 1930, and June 30, 1931*

State or Territory	County agricultural agents and assistants		County home demonstration agents and assistants		County club agents and assistants		Administrators and supervisors		Subject matter specialists		Total of all agents	
	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Alabama	88	92	57	58	------	------	13	13	18	25	176	188
Alaska	------	------	------	------	------	------	------	3	------	------	------	3
Arizona	14	17	6	7	------	------	3	3	9	4	32	31
Arkansas	83	78	67	68	------	------	14	15	16	18	180	179
California	85	86	30	28	1	------	12	10	20	23	148	147
Colorado	33	33	9	11	5	------	5	5	13	14	65	63
Connecticut	10	10	8	8	12	13	5	5	21	25	56	61
Delaware	3	3	3	3	3	3	3	3	5	5	17	17
Florida	55	49	40	39	------	------	13	12	7	13	115	113
Georgia	120	121	88	96	------	------	17	16	35	38	260	271
Hawaii	5	5	4	5	------	------	3	3	2	3	14	16
Idaho	26	26	7	7	2	2	6	6	18	20	59	61
Illinois	104	110	27	32	3	4	14	13	27	31	175	190
Indiana	84	85	8	12	8	7	12	13	30	30	142	147
Iowa	102	105	22	24	8	10	16	17	68	73	216	229
Kansas	75	82	31	35	5	4	12	12	39	40	162	173
Kentucky	93	94	26	30	------	------	17	18	28	37	164	179
Louisiana	78	76	40	44	------	------	16	16	17	19	151	155
Maine	15	15	14	14	7	7	4	5	9	9	49	50
Maryland	31	31	24	26	------	------	6	6	31	35	92	93
Massachusetts	16	19	15	16	27	28	7	8	15	18	80	89
Michigan	65	66	9	8	16	14	18	17	55	60	163	165
Minnesota	67	71	14	17	33	26	14	13	29	33	157	160
Mississippi	90	89	78	73	------	------	19	19	19	18	206	199
Missouri	67	68	18	16	------	------	10	10	29	34	124	128
Montana	38	35	13	14	------	------	5	5	16	19	72	73
Nebraska	45	47	10	13	1	2	5	8	22	25	83	95
Nevada	12	11	5	5	------	------	3	3	2	3	22	22
New Hampshire	11	11	9	10	14	13	5	5	10	14	49	53
New Jersey	23	23	22	19	8	9	5	5	17	19	75	75
New Mexico	20	19	13	12	------	------	5	6	4	7	42	44
New York	76	83	57	55	39	44	12	12	76	71	260	265
North Carolina	105	104	63	63	------	------	15	16	24	24	207	207
North Dakota	34	32	6	6	------	------	6	6	18	19	64	63
Ohio	90	79	25	28	10	10	12	15	58	64	195	196
Oklahoma	91	93	61	66	------	------	16	16	15	26	183	201
Oregon	35	34	7	7	8	8	8	7	16	20	74	76
Pennsylvania	71	73	34	44	------	------	11	12	45	44	161	173
Porto Rico	------	------	------	------	------	------	------	------	1	1	1	1
Rhode Island	3	3	2	3	3	3	3	3	5	5	16	17
South Carolina	65	64	55	55	------	------	15	14	28	29	163	162
South Dakota	32	32	15	14	6	5	6	5	15	17	74	73
Tennessee	95	92	54	53	------	------	12	13	18	24	179	182
Texas	206	219	141	146	------	------	26	26	16	21	389	412
Utah	20	22	6	6	------	------	4	5	10	14	40	47
Vermont	13	13	12	10	11	11	5	4	9	9	50	47
Virginia	104	106	52	53	------	------	18	18	29	36	203	213
Washington	36	36	10	12	5	5	3	3	9	10	63	66
West Virginia	43	44	21	25	4	15	13	11	24	19	105	114
Wisconsin	57	55	4	4	8	8	12	12	40	43	121	122
Wyoming	21	22	10	10	------	------	4	4	13	14	48	50
Total	2,755	2,783	1,352	1,410	247	251	488	495	1,100	1,222	5,942	6,161

Extension Service.

[1] Includes both white and negro extension workers.

TABLE 523.—*Cooperative extension work: Projects and percentage of agents' and specialists'*[1] *time devoted to each, 1925–1930*

Project	1925	1926	1927	1928	1929	1930
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Soils	5.2	5.3	4.8	5.1	5.1	
Farm crops	13.1	13.1	12.4	11.5	11.6	15.2
Horticulture	6.9	7.3	7.1	7.3	7.0	8.7
Forestry	0.5	0.7	0.9	1.0	1.0	0.9
Animal husbandry	7.1	7.5	8.2	7.8	7.6	6.5
Dairy husbandry	7.0	7.1	7.9	8.7	8.6	7.7
Poultry husbandry	8.7	9.0	8.8	8.1	7.9	7.6
Rural engineering	3.7	3.6	3.4	3.3	3.2	3.3
Rodents and insects	2.0	1.7	1.5	1.3	1.1	1.3
Agricultural economics	3.9	4.0	4.1	4.0	4.3	6.2
Foods and nutrition	7.1	7.2	7.1	7.0	7.5	7.0
Child care and training						0.6
Clothing	7.9	7.1	6.8	6.8	6.9	6.7
Home management	1.7	1.5	1.5	1.7	2.2	2.1
House furnishing	1.2	1.8	2.0	2.4	2.6	2.6
Home health and sanitation	1.2	1.2	1.2	1.2	1.2	1.3
Community activities	6.2	5.9	6.0	5.8	5.9	4.0
Miscellaneous projects	16.6	16.0	16.3	17.0	16.3	7.5
Building extension program						3.7
Organization						7.1

Extension Service.

[1] Only field work of specialists as reported by county extension agents is included.

TABLE 524.—*Extension activities and accomplishments, 1925–1930, as reported by all county extension agents*

Activity or accomplishment relating to extension	1925	1926	1927	1928	1929	1930
Total number of—	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Farm visits made	1,382,197	1,388,459	1,439,503	1,506,510	1,633,154	1,758,743
Home visits made	386,996	387,724	396,093	432,433	489,294	546,208
Office calls received	3,010,381	3,340,242	3,600,448	3,687,570	3,991,725	4,317,565
Telephone calls received	2,085,694	2,333,286	2,476,572	2,556,899	2,710,723	3,015,707
News articles or stories published			334,271	371,331	423,600	449,854
Individual letters written	3,767,160	4,015,126	4,208,801	4,510,657	4,712,940	4,501,988
Different circular letters prepared						214,561
Bulletins distributed			5,120,768	5,608,604	6,345,488	6,657,561
Radio talks made						4,148
Events at which exhibits were shown	8,269	8,938	8,983	8,999	9,826	20,476
Training meetings held for local leaders	27,887	29,109	38,064	42,902	41,604	42,903
Method demonstration meetings held	332,093	387,051	398,051	437,993	486,398	402,458
Meetings at result demonstrations						66,368
Tours conducted						8,772
Achievement days held						14,720
Encampments held	2,051	2,716	3,115	2,781	2,921	3,762
All meetings held	549,786	599,797	636,588	683,305	771,321	750,379
Total attendance at all meetings held	18,581,358	19,735,616	21,421,375	21,951,317	24,878,236	25,605,485
Total number—						
Result demonstrations conducted	772,469	644,784	772,185	851,526	929,744	934,182
Voluntary local leaders assisting with—						
Adult extension	160,587	173,122	183,065	179,559	201,882	233,043
Junior extension	47,995	48,899	60,182	58,258	71,636	85,344
Total number of—						
Adult home demonstration groups						34,959
Members of such groups						646,340

Extension Service.

TABLE 525.—*4-H club work: Number of clubs, enrollment, projects completed, etc., 1925–1930*

Item	1925	1926	1927	1928	1929	1930
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Junior clubs	41, 286	41, 234	44, 188	46, 671	52, 180	56, 180
Different boys enrolled	224, 633	234, 078	249, 553	270, 534	303, 509	333, 197
Different girls enrolled	340, 413	352, 078	370, 159	393, 406	452, 587	489, 517
Total enrollment	565, 046	586, 156	619, 712	663, 940	756, 096	822, 714
Different boys completing	133, 076	145, 202	153, 324	175, 069	201, 910	222, 472
Different girls completing	196, 498	223, 103	245, 783	272, 510	305, 577	331, 873
Total completing	329, 574	368, 305	399, 107	447, 579	507, 487	554, 345
Projects started	1, 079, 604	1, 161, 024	1, 330, 239	1, 466, 584	1, 614, 149	1, 535, 619
Projects completed (total)[1]	589, 440	673, 997	776, 029	882, 795	995, 262	971, 308
Cereals	24, 629	24, 107	25, 789	26, 997	29, 197	35, 380
Legumes and forage	4, 549	4, 988	5, 253	6, 137	7, 559	7, 902
Potatoes, cotton, and other special crops	29, 854	30, 458	25, 228	36, 475	40, 380	45, 010
Horticulture	62, 577	81, 494	88, 922	112, 296	124, 459	123, 751
Forestry	308	730	2, 192	2, 719	3, 852	5, 379
Rural engineering	----	----	----	----	----	6, 701
Dairy	17, 142	19, 094	23, 076	29, 468	37, 218	36, 554
Animal husbandry	31, 250	37, 409	44, 341	48, 233	54, 227	57, 790
Poultry	52, 795	52, 730	56, 756	56, 900	60, 020	61, 519
Agricultural economics	6, 841	6, 139	4, 925	8, 361	7, 379	6, 448
Foods	105, 856	131, 121	142, 302	167, 058	182, 877	} 193, 242
Nutrition	39, 259	39, 071	54, 451	62, 790	65, 652	
Child training and care	----	----	----	----	----	4, 508
Clothing	128, 970	133, 501	146, 181	162, 291	190, 249	209, 656
Home management	6, 477	10, 215	13, 822	16, 309	16, 237	17, 472
House furnishings	22, 268	24, 834	30, 024	36, 274	40, 999	49, 571
Home health and sanitation	28, 032	40, 857	56, 352	59, 342	77, 932	67, 810
Miscellaneous	28, 633	37, 249	56, 415	51, 145	57, 025	42, 615

Extension Service.

[1] Boys' and girls' club members completing.

TABLE 526.—*Imports and price per pound of raw silk and production, imports and price per pound of rayon yarn, United States, 1921–1931*

Calendar year	Raw silk		Rayon yarn			
					Average price [4]	
	Net imports [1]	Average price [2]	Production	Net imports [3]	150 A denier	300 A denier
	1,000 pounds	*Dollars*	*1,000 pounds*	*1,000 pounds*	*Dollars*	*Dollars*
1921	51, 846	6. 035	15, 000	3, 419	2. 671	2. 479
1922	57, 827	7. 219	24, 406	2, 993	2. 800	2. 650
1923	61, 511	8. 228	36, 477	6, 515	2. 800	2. 650
1924	59, 626	5. 917	37, 720	6, 569	2. 113	1. 871
1925	76, 003	6. 341	51, 902	12, 363	2. 004	1. 754
1926	76, 870	5. 937	63, 648	13, 918	1. 810	1. 603
1927	85, 036	5. 100	75, 555	17, 740	1. 489	1. 289
1928	87, 172	4. 859	97, 901	15, 113	1. 500	1. 300
1929	96, 848	[5] 4. 777	121, 566	20, 318	1. 246	1. 073
1930 [6]	80, 581	[5] 3. 173	110, 208	6, 009	1. 059	. 900
1931 [6]	87, 608	[5] 2. 233	144, 350	3, 460	. 758	. 636

Bureau of Agricultural Economics. Compiled from annual issues of Commerce and Navigation of United States Department of Commerce, except production of rayon yarn which is from Yearbook of the Department of Commerce. Prices are from bulletins of the U. S. Bureau of Labor Statistics.

[1] Net imports are imports minus reexports.
[2] Average of monthly average prices of Japanese Kansai, No. 1.
[3] Net imports are imports minus reexports 1921–1924. Subsequent years are imports minus exports and reexports.
[4] Average of monthly average prices. The count indicates the number of deniers or one-half decigram units, in weight, of a standard length of 450 meters. Since the standard is based on an arbitrary fixed length and a variable weight, the finer the yarn the smaller the count; 150 denier count, a size commonly used, is fine and 300 denier count is coarse.
[5] Average of monthly average prices of Japanese Best, No. 1 x 13–15.
[6] Preliminary.

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